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DEVELOPMENTS IN OXIDE PURIFICATION

PROGRESS and development in the design of oxide purification plant as practised in the North Thames area, information about which is so generously placed at the disposal of the industry in the paper which Mr. G. U. Hopton gave to the Southern Section of the Institution of Gas Engineers, appears at first sight to have little in common with the research work which has been going on during the last few years. Perhaps it is too much to expect that it would or could. The two lines of approach are not very similar. As we noted in Mr. Hopton's paper of April, 1948, the main factor in day-to-day gasworks practice still seems to be that of the labour required to take spent oxide out of the boxes. As Mr. J. E. Davis put it, 'There seem to be many ways of dealing with the oxide once it is on the move. The real difficulty lies in getting it on the move.' Hence the development of the tower and tower box purifier and especially the introduction of the interesting charging tray handled by crane which permits this difficult operation of ' getting it on the move '—in other words, breaking it up—to be carried out at leisure and in the open.

Discussion—and there was an exceptionally good discussion—turned mostly on considerations of cost, but this, as in so many other of the processes involved in town gas manufacture, can be only one of several considerations. Design, as Dr. J. Burns said, would be to a great extent determined by whether or not we can continue to get labour to operate the plant. What ' labour ' objects to is the nasty-smelling, arduous, and sometimes dangerous job of breaking up the oxide in the boxes and throwing it to the point of discharge. This nasty job could, it appears, be obviated or at least ameliorated broadly in two ways—either by getting rid of oxide hardening or by the development of mechanical means of moving the oxide. The first method was the subject of the research reported on in 1949. Little is heard of the application in practice of the routine then recommended. The second is shown in the several directions in which progress is being made with results which have not yet been fully made public, if indeed there is any substantial success to report.

The present paper makes no mention at all of the success, if any, which has attended efforts which have no doubt been made to implement the recommendations of the 1949 report. But it contains a hopeful crop of references to the second line of attack. This line may itself be sub-divided into two; that in which the crude bog ore is replaced by specially prepared nodules, tablets or ' broken press-cake ' of definite and known composition—there is no need to emphasise again the essential crudity of the still current use of naturally occurring bog ore or of reconstituted oxide—and that in which it is sought to substitute for intermittent filling and emptying of boxes a more or less continuous process. Such a process can, no doubt, be achieved with the greatest prospect of mechanical success when the purifying material is liquid. Present knowledge indicates no liquid method which is likely to achieve complete practical success. The best hope for such a process seems to be to operate it in series with a final oxide box. We therefore turn with high hopes to the possibilities of mechanical and continuous processes which retain the principle of dry purification.

Mr. Hopton describes two forms of mechanically operated, presumably still to some extent intermittent, plant which can work successfully with the new nodules or their equivalent. One of these, with oxide passing down a vertical vessel in which gas rises in counter current, seems to be broadly similar to the interesting experiment which the Institution inspected at Bournemouth in 1950 except that the purifying material is introduced and extracted in batches rather than in continuous flow. The other is described as a ' horizontal purifier ' in which the purifying material is moved vertically while the gas passes up and down across the set of six compartments. The Bournemouth plant would still appear to approach much nearer to an ideal system, a definitely

continuous process in which the oxide or other material moves in a constantly moving stream counter current to the gas. We look forward to learning in the near future more of progress made in all three of these lines of development.

A general impression of the situation of the attack on the problem of the removal of inorganic sulphur from crude gas is that we are justified in hoping for the evolution of plant and processes which, while removing every trace of hydrogen sulphide, will recover the sulphur in sufficient purity to command the top price for sulphuric acid manufacture and eliminate all manual labour in the handling of purifying material in and out of the plant. Such a process would be worth a considerable proportionate increase in the cost of sulphide purification, which would still remain a very small fraction of the total cost of gas.

HOTELYMPIA

ALTHOUGH by the time this appears in print the Hotel, Restaurant, and Catering Exhibition will have only three days to run, we hope that will not deter readers from making an energetic attempt to go to Olympia. For of all the exhibitions in which the gas industry participates this is probably the one at which it is most strongly represented. The catering load is of immense importance and even its partial loss to electricity would be serious in its economic effects. For this reason it is important that gas appliances in this field continue to improve. That they should improve at the same rate as electrical appliances is rather a lot to hope for. The electrical industry has made immense strides during the past 20 years in providing equipment acceptable to the caterer. It still has a long way to go and, moreover, we have tradition on our side. The chef tends to be conservative and is loath to change from something to which he is accustomed and which gives him satisfaction. At the exhibition gas is still well in the lead, but it must be admitted that improvements effected in gas exhibits are for the most part of a minor nature. The need for thermostatic control on most gas appliances is now fairly generally recognised and a further move has been made towards the elimination of sharp corners and unsightly projections.

At the last Hotelympia the Gas Council and the British Electrical Development Association were not represented, due to their inability to obtain ground floor accommodation. The difficulty has been overcome this year and both have stands in quite satisfactory positions. In design the gas stand marks something of a break with tradition, being different both in layout and colour scheme from most stands of recent years. Its appearance is pleasant and we note with approval the incorporation of a small lounge in the design, where visitors may discuss their problems in comfort. In our opinion this trend might well be developed, and this raises another point. Here is an exhibition literally crowded with gas exhibits. Why then was it considered necessary to place on the Gas Council stand a large number of appliances, some of which were duplicated elsewhere in the show? The gas industry has a most interesting and vital story to tell concerning the layout of large scale kitchens and details of satisfactory installation. These are things which would greatly appeal to the specialised visitor—and, after all, he is the man we are after. It was a little surprising to note the large coke burning range exhibited, an indication—and a welcome one—of the importance attached to the coke load, particularly where gas supplies are not available. We believe rather more importance might have been given to the coke grate, but it may have been decided that since the one grate shown could not be flued, and was thus exhibited complete with unconvincing red cellophane, there was little to be gained by adding to a 'dead' display.

The point about the desirability of showing appliances is, of course, a matter of opinion. If one is prepared to concede that they should be shown, then the stand must be pronounced excellent. The Gas Council is also to be congratulated on providing the kitchen in the demonstration theatre, which has considerable prestige value. Summing up, this is a wonderful show—and not only from the gas viewpoint. We hope that it has been or will be visited by members of gas staffs whose work is in any way connected with catering, particularly if their experience is limited to the products of only a handful of makers.

DISCRIMINATION

FROM the fact that two of its most experienced members have expressed to their respective consultative councils this month their deep concern at the discrimination which the National Coal Board has shown against the gas industry in its new coal price structure it may be assumed that the Gas Council is aware of the situation and that, although strictly such matters are the concern not of the Council but of the area boards, it will bring a very real grievance to the notice of the appropriate Minister. Co-ordination of all the fuel industries is of growing importance and the contention of both Mr. Michael Milne-Watson and Mr. G. le B. Diamond that identical coal is being sold at a lower price for wasteful combustion in the domestic grate than for economical treatment at gasworks is one that calls for investigation and adjustment. Dearer gas is an inevitable consequence of a general rise in the cost of coal, but it is difficult to see why the gas industry should pay 12% more for its coal while electricity pays only 5.8% more, iron and steel and household coal 10%, and general industry 8.4%. The latest jump in cost of coal, plus higher freight charges, has resulted in a further rise of 1½d. per therm in the area of the North Thames Gas Board, following a rise of a similar amount little more than six months ago, and bringing the flat rate to 19.1d. per therm against the pre-war average of 9d. House coal has doubled in price since 1938; anthracite nuts have gone up two and a half times, but the gas industry is now called upon to pay three and a half times the pre-war price. The figures are approximate and they vary in different parts of the country but the overall effect is that the gas consumer must pay an undue share of the increased cost of fuel. The West Midlands Gas Consultative Council has sent a protest to the Minister of Fuel and Power; the North Thames Gas Consultative

Council, while in sympathy, decided not to pass a resolution on the subject lest any consequent readjustment of prices might weigh heavily on poor people who have to use solid fuel.

APPLIANCE DESIGN

An acceptable gas appliance has to meet a range of technical requirements which necessarily embody safety and include thermal efficiency. It has also to meet sales requirements. These two sets of requirements are distinct. From certain points of view they may be in accord; from others they are definitely opposed. Consequently, when a new appliance is being developed it is necessary to strike a balance between incompatible aims. In fact, much ingenuity is needed to solve the technical problems that arise from an improvement in some particular sales feature. In brief, there must be effective compromise. That is why it is so necessary that the technical man should be aware of what the salesman thinks his customers are asking for —and, conversely, that the salesman should be broadly conversant with the limitations which the technician and the manufacturer have to face. The consumer pays the bill and ultimately calls the service tune. This tune is based on what can be offered in a competitive market. What the salesman has to do is to interpret this tune to the technician who, in his turn, has to do his best to turn out of the laboratory and the factory instruments by which the tune can be played.

The consumer is not always right. The public does not always know what it needs. We have been very interested in a paper by Dr. Harold Hartley, Chairman of Radiation Ltd., at the recent convention of the Australian Gas Institute, in the course of which he discussed the background of appliance design. As he remarked, without guidance the majority taste may reject what is new simply because it is unfamiliar. Standards of safety, efficiency, and hygiene have been established as the outcome of experience which the public cannot possess. Standards have to be maintained in the field of æsthetics so that the public may acquire a liking for good form, which, however, is only one factor in good quality. Ultimately the project will be judged by the extent to which all aspects—visual, technical, operational, and constructional design—are integrated into a coherent whole.

Technical design embraces such considerations as completeness of combustion, efficiency of heat transfer, ease of operation, and so on; and it will be agreed that great progress has been made by the thorough-going application of scientific principles. In regard to operational and functional design, market research can disclose conditions which call for urgent action; it can be of value in ascertaining the opinions of consumers on the appliances they use; it cannot be expected to give reliable guidance to the designer in his attempt to open up a completely new field or to introduce modifications with which the public are not familiar. The initiative in new ideas usually comes, as Dr. Hartley said, from those trained and engaged in the industry and must be based on facts derived from scientifically controlled investigations. And in constructional design a compromise is generally necessary between what is technically or æsthetically desirable and what is economically possible.

This matter of compromise was also in the forefront of a paper by Mr. G. H. Fuidge, Chief Physicist to the South Eastern Gas Board, in a paper he gave recently to the London and Southern Junior Gas Association. Gas service could be improved by closer co-operation between technician and salesman, but the fact stands out that very real developments have been made, particularly in recent years, by mutual recognition and understanding of common aims. Examples come readily to mind. Some of them were touched upon by Mr. Fuidge, among them the development of the balanced flue principle, development in which he himself has played a considerable part. The practical introduction of this principle has met several important technical and sales requirements. In regard to space heating, technically the balanced flue heater has the advantage over the flueless heater that the products of combustion are not discharged into the room. In its application to water heating the appearance of the appliance has been improved. Technically the improvements are even more important. Safety in respect of products of combustion has been solved in that the appliance can be fitted in any room irrespective of size having an outside wall. We mention the application of the balanced flue principle as an example only of that balance between sales and technical requirements which is so desirable.

And, turning to the broader aspect and looking to the future, we would quote the following from Dr. Hartley's paper: 'Our task is not merely to give the public what it wants. We must have the knowledge, and the ability to use the knowledge to practical effect, so as to provide new conceptions and methods which will make for the health, comfort, and general well-being of the individual. We must lead and not follow public demand.'

CAST IRON AND STEEL

CONSIDERATION, it is understood, is being given by the Government to limiting output of iron castings this year to 3,500,000 tons, the aim being to secure a balance of raw materials to the steel makers and the iron foundries. In 1951 the output of the iron foundries was 3,750,000 tons, compared with 3,500,000 tons in 1950, in spite of raw material cuts. In consequence stocks were reduced. It has been stated by the British Iron and Steel Federation that the estimate of steel production of 16 mill. tons in 1951 was based on iron castings production not exceeding 3,500,000 tons, and that if this figure had been adhered to the steel industry would in fact have reached the estimate.

NEW BUILDING CENTRE OPENED

WE have commented in these columns on the scope and possibilities of the new premises of the Building Centre in Store Street, Bloomsbury. In the presence of a large gathering, among whom were Colonel H. C. Smith, Chairman of the Gas Council, and Mr. J. H. Dyde, President of the Institution of Gas Engineers, the Minister of Works, Mr. D. M. Eccles, officially opened the premises last week. Mr. Eccles described the Centre as 'a shining example

of co-operation and private enterprise,' adding that our knowledge was far ahead of our practice, and in lessening the gap the Centre had a most important part to play. The architect, the builder, the workman, and the student could go to the Centre and learn how to serve the public and, in the process, advance their own careers.

ECONOMICS OF FREEDOM

COAL price discrimination against the gas industry—a matter to which we have made reference in an earlier note in this issue—is in turn related to the question of freedom of choice of fuel for tenants of council houses. At last week's meeting of the Eastern Gas Consultative Council three local authorities in the eastern counties were mentioned as being unwilling to bear the cost of installing gas in new housing estates, but not opposed to tenants making their own arrangements for having gas, at their own expense. But one member of the Council, who is housing manager at King's Lynn, disclosed that under a 'subtle' electricity tariff it had been found cheaper to boil a kettle by electricity than by gas; and in another instance the Chairman himself confessed that the price the Board was able to charge for gas did not cover the cost of production, and any early success in persuading the local authority to put gas into new houses might not be economically helpful to the Gas Board. The real trouble is that if the opportunity of installing gas services while houses are being erected is missed, the cost of subsequent installation is enormously increased, and the Council very properly agreed to adhere to its advocacy of freedom of choice for all. There is plenty of work for the Ridley Committee to do, and the restoration of a proper balance between the prices and availability of different forms of fuel is not the least of its tasks.

Letters to the Editor

ASPECTS OF NATIONAL ECONOMY

DEAR SIR,—Certain of the scarcities and difficulties we suffer are closely inter-related; for example, coal and iron and steel and transport.

(1) The most economical way to use coal for domestic and commercial heating is to carbonise it to gas and coke. Yet it appears that carbonisation is being penalised by inequitably high prices for coal instead of being encouraged by favourable terms. What sort of a fuel policy is this?

(2) Both gas industry and Government rightly encourage the use of coke. Yet the gas industry consumes every year a higher proportion of coke to make water gas—and gas coke is increasingly diverted to steelworks and foundries. What is the use of being patriotic and installing coke burning apparatus if coke is not available when wanted?

(3) Scarcity of plant, largely attributable to scarcity of steel, encourages the further installation of water gas plant as being less difficult to obtain, and so (apart from other disadvantages) increases the scarcity of coke just when the demand is greatest.

(4) The effect of controls has been to make iron castings less difficult to obtain than finished steel—so reversing the trend to replace cast iron by steel. There is evidence that there has been a disproportionate increase in the use of cast iron (because steel has been hard to get) and this country now uses more cast iron in proportion to steel than any other—and now may be able to afford to do so less than any other country.

(5) For every ton of iron or steel made, about 5 tons of raw materials, including about 2 tons of coal (used mainly as coke) have to be got and transported, usually more than once, and handled and processed. Pig iron has now become a precious material and weight-savings in use are now of as vital importance here as they have been for decades in countries less rich than ours.

(6) Wherever an iron casting can be replaced by steel, weight is saved. Approximate ratios are: by sheet and light gauge tubing, about 4 to 1; by weldments from plate, up to 3 to 1; and by pipes, about 2 to 1, in favour of steel. Often, too, more steel is used than necessary and in heavier gauges. Every single ton means 3 tons of raw materials plus 2 tons of coal.

(7) Wherever a quarter to half a ton of steel replaces a ton of cast iron, half to three-quarters of 3 tons of materials plus half to three-quarters of 2 tons of coal are set free for making extra steel, over and above that used in replacement. The nation's economy demands that those materials and that coal go to steelworks where capacity is increasingly idle. As steel shortages are relieved in this way, possibilities of relieving transport and of exporting coal against essential imports begin to come into sight. Less transport, too, will be needed for an equal or greater volume of products of quarter to half the tonnage.

(8) The total production of iron castings in 1950 was nearly 3½ mill. tons and included, for example, over 1 mill. gas and electric cookers using over 50,000 tons of cast iron; pipes and fittings using over 570,000 tons of cast iron; other iron castings and unallocated over 240,000 tons. Usage is increasing, 3¾ mill. tons in 1951, and 4 mill. tons estimated for 1952.

(9) Technological developments over the years have made possible the saving of 50,000 tons of cast iron in domestic gas and electric cookers, at the present rate of production. This would need about 12,500 tons of steel sheet and tube, but would set free materials and fuel for an extra 37,500 tons of steel, additional to the 12,500, for use elsewhere. So to make cookers alone would use 37,500 tons of raw materials instead of 150,000 tons, and 25,000 tons of coal instead of 100,000 tons. A walk round any gas showrooms or any gasworks will soon suggest means for saving the country hundreds of thousands of tons of raw materials and of coal and of transport. What are we waiting for?

Mere deprivations and negative restrictions are not economy. They starve industry, waste resources, and damage our economy. Steel must be released to make available multiples of steel and coal and to relieve transport. A bold and positive and creative approach is needed. If enough people take enough interest, if every one of us takes enough interest, action may follow. Is there not opportunity for the gas industry to seize the initiative, to strike bargains, to set an example in solving problems that so vitally affect the national interest? Let us at least not tamely be overcome by difficulties and excuses that are more imaginary than real.

Yours faithfully,

T. B. V. HIRST.

9A, Cheviot Court,
Luxborough Street, W.1.

January 19, 1952.

ECONOMICS OF GAS MANUFACTURE

DEAR SIR,—Messrs. Nicklin and Redman, in their paper to the Manchester and District Section of the Institution of Gas Engineers (*Journal* of January 23, p. 238), have extended their economic enquiries outside the three standard forms of plant. By considering more recent forms of gas production, as from refineries, L.P. gases, and from crude oil, they have added value to the paper and have given the gas industry an up-to-date, comprehensive guide which will be used and appreciated by all who have to decide upon extensions and alterations to gas production capacity.

It is, however, often necessary that factors other than purely economic ones should receive attention if a complete assessment of value is to be obtained. What I have in mind are the pros. and cons., not measurable in therms of £ s. d., which have an important bearing on such decisions as the final choice of plant. Thus, many considerations other than strictly economic ones are involved in siting of plant. Even though, as the authors state, 'the cost of coke oven gas is 0.5d. per therm less than that of gas produced in the most

economical gasworks plant,' it would, I think, be a difficult task to present a case for the replacement of many existing plants, say, of verticals, in or near large or medium sized towns, by coke ovens even if the present type of plant is due for replacement. Similar considerations of amenity, etc., affect decisions as to whether horizontals or verticals should be installed.

This recognition of factors not strictly economic is, I think, called for when considering the authors' comments on the assessment of production costs of producer gas and the economics of firing settings with mechanical producers. The advantages and disadvantages of mechanical and step-grate producers for the heating of settings have previously been the subject of much technical investigation, particularly in the Liverpool and Manchester undertakings, and I well remember discussion of the matter in which Mr. Nicklin joined at a meeting of the Manchester and District Junior Association of Gas Engineers in February, 1948. The following, among other advantages, were then claimed, with good reasons, for mechanical producers: Improved working conditions; elimination of dust in the retort house; greater flexibility for sudden increased loads; longer life of settings, due to absence of dust in setting flues; more assurance of supply of uniform quality and quantity of producer gas.

These claims are examples of factors which are difficult, if not impossible, to measure in economic terms alone, but they are nevertheless important and real. With these factors in mind I should question the authors' conclusions that there is no economic case for mechanical producers on horizontal settings except where producer capacity is inadequate, and that there is no economic justification for mechanical producers in vertical settings unless there is a breeze production greater than 8% saleable at only 20s. per ton. I criticise these conclusions because I think that they exclude due consideration of immeasurable and non-economic factors such as those I have mentioned.

The interesting account given by the authors of the three chief methods by which refinery 'tail-gas' may be utilised, and their support of its utilisation if it is available at an economic price, confirms the soundness and value of the decision originally taken by the then Manchester Corporation Gas Committee (1949) after negotiations with Dr. Kind, Managing Director of Petrocarbon, Ltd., to utilise the considerable volume of tail-gas available from the Caterole process.

Simple dilution with producer gas as referred to in the paper was originally adopted, and a preliminary account of the problems involved was given in a paper presented to the Manchester District Association in October, 1949, by Mr. H. C. Applebee and myself.

Despite the opinion given in the present paper that 'dilution with producer gas is the most economical method of utilisation,' I still regard dilution with blue water gas as a better method, especially for large volumes, as the distribution of large proportions of inerts—particularly nitrogen from the producer gas—cannot be economic and it is also undesirable for other technical reasons.

I believe that the gas industry awaits with keen interest the experience of operation, costs, etc., of the two L.P. gas/air plants (American and French) which have just started up at Whitland, Carmarthenshire, as a result of the pioneering decision of Mr. E. M. Edwards and the Wales Gas Board. On this subject, I fully support the view of the authors that the use of L.P. gases should be very seriously considered as an alternative to renewal of small uneconomic plants which are outside the scope of integration, if the L.P. products can be delivered and stored at competitive prices. This is likely to be the case. It has been recently reliably estimated that some 450,000 tons per annum of these products will be available during the next few years.

A recent estimate of the comparative costs of L.P. gas/air and other plants for small works gas production gave the following figures, which are in line with those given in the paper:—

Estimated Cost of Manufacture including Capital Charges:

	Total Cost/Therm Pence.
(i) C.W.G. (automatic), 300,000 cu.ft. per day, C.V. 500	9.200
(ii) B.W.G., with propane enrichment, C.V. 500 ...	9.90
(iii) Gas oil gasification plant	12.40
(iv) B.W.G. with propane reforming	14.0
(v) Propane/air plant	12.8

These costs were based on coke price, 65s. per ton.
Gas oil, 1s. 2d. gal.
Propane, £25 ton.

It is noteworthy that L.P. gases are used on the Continent for enrichment of both town gas and producer gas.

Assessment of production costs and the review of the relative costs of production in the three standard forms of plant is done by the authors in a masterly manner, and their views on the relative importance of items making up total cost emphasises again the major dominance of coke price in determining the net cost of coal. As this coke price has varied so much in the past, so it is likely to vary again, and the sound judgment of most large undertakings in the past of installing and operating dual types of standard plant with water gas for peak loads is demonstrated.

Yours faithfully,

R. WALKER.

Garth,
Sedbergh Park,
Ilkley,
January 24, 1952.

Personal

The Minister of Fuel and Power has appointed **Mr. H. F. H. Jones,** M.B.E., A.M.I.C.E., M.INST.GAS E., Chairman of the East Midlands Gas Board, to be Deputy Chairman of the Gas Council in succession to Colonel H. C. Smith, C.B.E., D.L., J.P., M.I.C.E., M.INST.GAS E., who became Chairman of the Council on the retirement of Sir Edgar Sylvester. The appointment dates from February 1. Mr. Jones has been Chairman of the East Midlands Gas Board since 1948.

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Mr. K. P. Fellows, Draughtsman in the Wolverhampton division, has been appointed Assistant Engineer and Manager at Rowley Regis. Other appointments announced by the West Midlands Gas Board include that of Mr. J. Toplass, Distribution Foreman at Hanley, to the post of Distribution Superintendent at Stoke Fenton.

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Mr. S. Hall has been appointed Sales Director of Thomas Glover & Co., Ltd. Mr. Hall joined the Company in 1925 as Scottish representative, and was subsequently appointed Northern Sales Manager covering Scotland, Northern England, and Northern Ireland. Prior to that date he was Sales Superintendent of the Edinburgh Corporation Gas Department. He joined the Board of Thomas Glover & Co., Ltd., in March, 1951.

Mr. C. A. Macleod, Sales Director, R. & A. Main, Ltd.

Mr. S. Hall, Sales Director, Thomas Glover & Co., Ltd.

Mr. C. A. Macleod has been appointed Sales Director of R. & A. Main, Ltd., and will be in control of all the home and export sales of that Company. He succeeds **Mr. P. D. M. Aird,** who will be devoting more time to his other duties as Vice-Chairman of Glover & Main, Ltd., and Joint Managing Director of R. & A. Main, Ltd. Mr. Macleod joined R. & A. Main, Ltd., in London in January, 1920, and from the following year represented them in the eastern counties, south-east England and parts of the London area until the war began in 1939. In 1945 he was appointed Assistant to the Company's Southern Sales Manager, and on the retirement of Mr. H. F. Potter, in January, 1949, was appointed Southern Sales Manager. Mr. Macleod joined the Board of R. & A. Main, Ltd., in March, 1951.

Mr. T. A. Tomlinson, M.B.E., who is now Consulting Engineer to West's Gas Improvement Company, Ltd., celebrates today his fiftieth anniversary with the firm.

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Mr. H. F. Snow, representative for the South of England of William Edgar and Son, Ltd., having recently undergone a serious operation, has now returned to light duty.

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Mr. J H. Solman, Foreman of the woodworking department of Bratt Colbran, Ltd., was recently the recipient of a presentation to mark the occasion of 50 years continuous service with the Company. The presentation, which took the form of an inscribed gold watch and chain, was made at the Lancelot works, Wembley, at a gathering of the entire works and office personnel.

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Mr. C. E. Harris and **Mr. M. H. Godfrey** were for the fourth year unanimously re-elected Chairman and Hon. Secretary of the South Met. (No. 4) Salaried Officers' Branch of the British Gas Staff Association, at the annual general meeting held on January 15. They were two of the original founder members and have seen the membership steadily increase, and now with the three other branches in the Metropolitan Division have a joint membership of 1,386.

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Following the death of Mr. W. G. Swain, Managing Director of Crypto Ltd., the Directors of the parent company (Lancashire Dynamo Holdings Ltd.) have, pending the return of their Chairman, Mr. H. W. Bosworth, from his Australian business tour, appointed two of their number—**Mr. D. C. Lorkin** and **Mr. S. G. Mundy**—to act as Joint Managing Directors of Crypto Ltd. The position of Mr. Lorkin as Joint Managing Director of Lanashire Dynamo & Crypto (Mfg.) Ltd., and of Mr. Mundy as Managing Director of Crypton Equipment Ltd., will not be affected by this arrangement.

Obituary

Mr. D. A. Pratt, widely known representative of Firth, Blakeley, Sons & Co., Ltd., Church Fenton, died at York Hospital on January 21. Mr. Pratt, who was 66 years of age, travelled extensively for his firm in this country and also in Ireland during the past 46 years, and regularly attended the many district association meetings.

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Mr. Robert Greig Thomson, Chairman of Clayton, Son & Co., Ltd., gas and constructional engineers, Hunslet, Leeds, died at his home at Roundhay, Leeds, on January 18. He was 82. Mr. Thomson was also a director of Deighton's Patent Flue and Tube Co., Ltd., and Goodall Clayton & Co., Ltd., both of Hunslet, Leeds, and became Chairman of Clayton, Son & Co., Ltd., in 1945. He was born in Scotland and went to Leeds in 1906.

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Colonel George Bray, M.C., T.D., died suddenly at Leeds on January 4, at the age of 63. Colonel Bray was Chairman and Managing Director of George Bray & Co., Ltd., Leeds (one of the oldest firms in the gas industry, founded by his father in 1863). He joined it at the age of 17. Colonel Bray was a former President of the Yorkshire section of the Institute of Production Engineers and a member of the Council of Leeds University. His other interests included Chairman of the Board of Governors of East Moor School, Leeds, founder Member and Treasurer of Leeds Housing Trust, Patron of Leeds Parish Church, and Chairman of the Adel War Memorial Trust. Colonel Bray was commissioned in the 2nd West Yorkshire Volunteers, R.E. in 1906, and served in France during the first world war where he received the Military Cross. He commanded the 49th (West Riding) Infantry Division Signals (T.A.) from 1932 to 1936. During the second world war he served with the Home Guard.

Diary

Jan. 31.—North Thames G.C.C.: Caxton Hall, Westminster, 2.30 p.m.

Feb. 1.—London and Southern Juniors: Development of a Temperature Limit and Over-heat Control', N. D. B. Harris (North Thames); 'The Gas Engineer and I', Mrs. Eileen Murphy (Gas Council); 'Notes on an Installation of Economic Boilers', G. J. B. Cox (South Eastern). 178, Edgware Road, 6.30 p.m.

Feb. 4.—West Midlands G.C.C.: Special meeting, Birmingham.

Feb. 5.—South Eastern G.C.C.: Brettenham House, Waterloo Place, 2.15 p.m.

Feb. 5.—Midland Juniors: 'Coke and Its Appliances from the Domestic Angle', H. A. Barron (Birmingham).

Feb. 6.—Wales Juniors: 'Distribution Organisation and Records,' C. W. Leys. Victoria Institute, Port Talbot, 10.45 a.m.; luncheon, Grand Hotel, 1 p.m.; visit to Margam works of Steel Company of Wales, Ltd., 2 p.m.

Feb. 7.—Chemical Engineering Group (S.C.I.): Joint Meeting with Nottingham Section, S.C.I.: 'Extraction and Utilisation of Methane from Coal Measures,' Dr. D. W. Gillings.

Feb. 8.—Scottish Juniors (Western): Paper by R. A. Currie (Glasgow). Royal Technical College, Glasgow

Feb. 8.—Midland Section, I.G.E.: Discussion on Report of the Sub-Committee on Unaccounted-for Gas (I.G.E. Comm. 380), to be opened by H. J. Escreet, Chairman of Sub-Committee. Grand Hotel, Birmingham, 2.30 p.m.

Feb. 9.—Scottish Juniors (Eastern): Short paper meeting. Edinburgh.

Feb. 9.—Western Juniors: Visit to Exmouth works; 'Psychology and Plant Operation,' H. C. Widlake (Plymouth).

Feb. 13—London and Southern Juniors: Evening visits: (a) Nevill's Bakeries, Acton; (b) Kemsley Newspapers, Ltd., Kemsley House, W.C.1.

Feb. 16.—Yorkshire Juniors: 'Gasworks Effluents,' W. H. Blackburn, PH.D., M.SC., Research Chemist to Joint Research Committee of Gas Research Board and Leeds University. At Leeds University.

Feb. 19.—Institute of Fuel: 'An Investigation of Whole House Heating,' F. C. Lant, A.M.I.H.V.E., and J. C. Weston, PH.D., M.I.H.V.E., Institution of Mechanical Engineers, Storey's Gate, S.W.1. 5.30 p.m.

Feb. 19.—London and Southern Section, I.G.E.: 'The Consumer and the Gas Industry in a World of Changing Standards,' Professor D. M. Newitt (Past President, Institution of Chemical Engineers), 17, Grosvenor Crescent, 2.30 p.m.

Feb. 20.—Wales Juniors (North): Shotton. Visit to spent oxide treating plant of J. Summers.

Feb. 21.—Midland Juniors: Half-day visit to Humber, Ltd., Coventry.

Feb. 21.—London and Southern Juniors: Visit to Thomas De La Rue & Co., Ltd., Cavendish Works, Wandsworth, 2.30 p.m.

Feb. 21.—Institute of Sewage Purification (Metropolitan Division): Paper by Philip Wedgwood (Eastern Gas Board), Friends House, Euston Road, London, 6.30 p.m.

Feb. 23.—Manchester Juniors: Annual Dinner. Manchester.

Feb. 28.—Society of Chemical Industry (Yorkshire Section): Joint meeting with Leeds University Chemical Engineering Society: Hodsman Memorial Lecture, A. C. Monkhouse, B.SC., PH.D., F.R.I.C.

Feb. 28.—North Thames G.C.C.: Westminster City Hall, Charing Cross Road, 2.30 p.m.

Mar. 1.—Midland Juniors: Annual Dinner, Imperial Hotel, Birmingham.

Mar. 3-29.—Ideal Home Exhibition, Olympia. Gas Council stand No. 67, Grand Hall.

Mar. 4.—Midland Juniors: 'The Equipment of Combustion Safeguard Equipment,' J. Price (Coventry). At Birmingham.

Crewe Gasworks Pass to N.W. Board

A TOTAL of £250,000 is to be paid to the Railway Executive by the North Western Gas Board for Crewe gasworks and distribution system, which have now been taken over, and will in future be operated, by the Board.

Erected in 1886, the works have a daily capacity of 2 mill. cu. ft., and serve 13,000 consumers in the Crewe area, including a number of important industrial firms and the railway workshops.

Manual workers at the works will transfer from the Railway Executive to the Gas Board on the terms applicable to gas workers, but the gas works staff will remain railway employees for the present, carrying out their duties under special arrangements.

Price Increase in Scotland

BECAUSE of increased costs, the price of gas in many areas of Scotland is to be increased by 1d. a therm from the next reading of meters, it was announced by the Scottish Gas Board in Edinburgh on January 18.

The increase, which represents about 7½% on the average price, or about 2½d. per week for the average household, will take the form of 4d. per 1,000 cu. ft. in areas where charges are levied on that basis, but there will be no increase in 26 undertakings where the basic rate is already 8s. 8d. or more.

Sir Andrew Clow (Chairman of the Board) said that the latest increase was required mainly to meet the recent rise in the price of coal, which at present rates of supply represented further costs of about £860,000. Increased transport charges, for coal alone, were estimated to add an expenditure of about £125,000, and other increases were £200,000 in wages and salaries, £250,000 in prices of materials and other articles purchased and higher capital charges, which would add about £200,000 to requirements for interest and depreciation.

The result was an increase for a full year of about £1,635,000. Against that the Gas Board expected to get a higher revenue from the increased price of coke and higher prices for tar and breeze of about £43,000. The Board also anticipated an increased income of £200,000 over the current year from the previous change in gas prices. That left a balance of about £1 mill. to be met, and it was estimated that 1d. a therm would at present rates of supply yield only about £850,000 per year. The Board hoped that a small increase in demand and a small balance which was expected this year would suffice to meet the deficiency, and it was anxious at the present time to avoid imposing a higher charge than seemed necessary.

Present charges in the four principal Scottish cities are: Glasgow—ordinary consumers 13.89d. per therm, prepayment consumers 15d. per therm; Edinburgh—13d. and 13.3d.; Dundee—15.25d. and 15.75d.; and Aberdeen—15d. and 15.4d. In Aberdeen the present increase will be ½d. only, because an increase of 2d. was made recently.

SCOTSMEN VISIT THE NORTH WEST

SCOTTISH Gas Board members paid an informal visit to Manchester recently to look over the West Egerton Street works of the Salford undertaking of the North Western Gas Board (Manchester Group).

They were shown round the Salford works on January 10 by Mr. F. Litler, Deputy Chief Technical and Planning Officer to the North Western Board, Mr. Thomas Nicklin, Production Engineer to the Board, and Mr. John Wilson, General Manager of the Manchester Group.

Mr. D. D. Burns (Deputy Chairman), Mr. D. D. Melvin (Member, Scottish Gas Board), and Mr. E. G. Smith (President of the Scottish Association of Gas Managers), with Mr. Ernest West and members of the staff of West's Gas Improvement Co., Ltd., inspecting the central control room.

The party from across the Border consisted of Mr. D. D. Burns (Deputy Chairman, Scottish Gas Board), Messrs. D. D. Melvin, J. Campbell, and David Fulton (Board members), accompanied by Mr. E. G. Smith, President of the Scottish Association of Gas Managers, who is Deputy Divisional Controller at Glasgow.

Before returning to Scotland on the following day, the party visited the technical and planning headquarters at Bradford Road where they were welcomed by Mr. W. Hodkinson, M.B.E., Chief Technical and Planning Officer.

BUTANE AS A TOWN GAS

South Wales Pilot Plant in Operation

THE Whitland (Carmarthenshire) butane/air gas experiment was brought into operation on January 22 and was described later in the week by Mr. T. Mervyn Jones, Chairman of the Wales Gas Board, as 'an unqualified success.' The method of using a butane/air mixture for ordinary town gas purposes is new to Britain, although it has been used in France and the United States, and it is being treated by the Gas Council as a pilot experiment for the whole country. Our South Wales correspondent reports that the Gas Council is to hold its next meeting at Tenby, about 12 miles from Whitland, to study the experiment—the first time it has met in Wales.

Mr. Mervyn Jones said that butane/air mixture had a higher heating value than coal gas with a calorific value of 730 B.Th.U. compared with 450 B.Th.U. with coal gas.

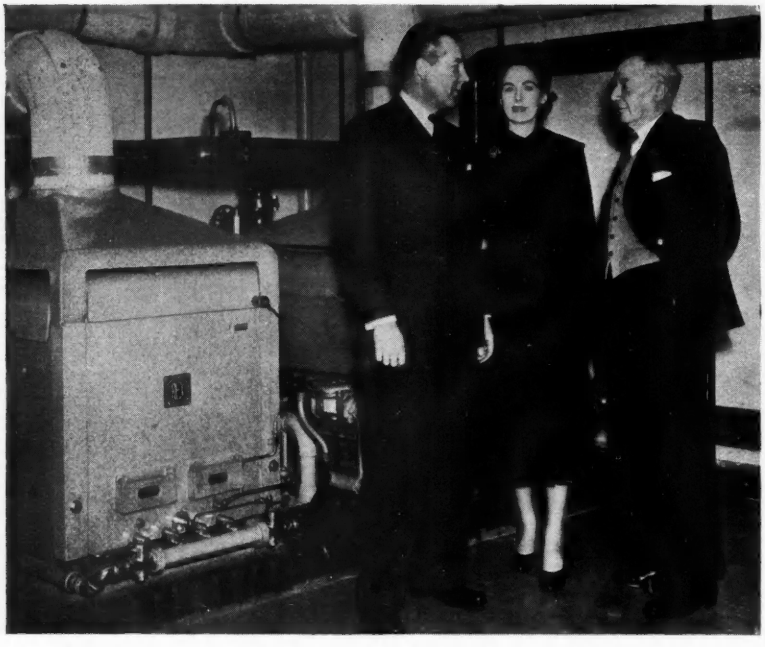
The system was most suitable at small gasworks and it was possible to extend it to 52 small works in Wales which supplied between 2,000 and 3,000 consumers. At the Whitland plant they were using 538 tons of coal a year, and if all the 52 works were turned over to butane there would be a saving of 75,000 tons of coal a year.

The Whitland plant would never again use coal. In a three-hour test the plant turned out enough butane mixture to supply the town for 24 hours whereas it would have taken 18 hours with coal.

The future development of butane depended on the prices at which the oil distillation companies would supply it to the gas industry. They had been very co-operative. The cost of butane to consumers is the same as for coal gas at present but because of its higher calorific value it gives better efficiency for the same price. The refinery had guaranteed supplies of butane.

If the use of the new gas were extended the undertakings affected would be the smaller ones of less than 3,000 consumers, but this would mean nearly all the undertakings in West Wales, Mid-Wales, and parts of North Wales. Highly industrialised areas would be least affected.

NEW BUILDING CENTRE OPENED



Mr. David Eccles, M.P., accompanied by Mrs. Eccles, formally opened the new Building Centre at Store Street, Bloomsbury, on January 21. The attendance at the ceremony was a very large one and included Sir Giles Scott, O.M., R.A., Sir Alfred Hurst, K.B.E., C.B., Sir Luke Fawcett, O.B.E., Colonel Harold C. Smith, C.B.E., Chairman of the Gas Council, and the Mayor of Holborn. In reply to Mr. Eccles, Sir Alfred Hurst, Chairman of the Building Centre Council, advised all present to make a special point of inspecting the thermostatically controlled gas-fired installation which provides central heating for the whole of the Building Centre. He said they were particularly proud of this installation. The picture shows Mr. Eccles inspecting the De La Rue 2 Series 'Rex' Potterton boilers.

South Western Anomalies Committee

THE Taunton Local Committee of the South Western Gas Consultative Council at its meeting on January 11 was informed of the effects of the recently introduced gas tariffs on an industrial firm at Bridgwater who used substantial quantities of gas. Councillor A. W. Loveys, Chairman of the Consultative Council, said the Council had discussed at its last meeting similar representations by industrial gas users in other parts of the area, and had decided to set up an Anomalies Committee which, in joint consultation with the Gas Board, would consider what variations of structure and application it would be desirable to incorporate if and when new tariffs came into force. On behalf of the Gas Board, Mr. T. W. Jackson showed that the price being charged in this particular case was very reasonable in relation to the cost of manufacture.

The protesting firm was invited to submit fuller particulars of the grounds of their complaint so that it could be given consideration by the Anomalies Committee.

A member of the Committee raised questions as to the time interval between the rendering of accounts by the Gas Board and the issuing of a notice mentioning recourse to legal action. Mr. Jackson said the arrangements provided for an interval of at least 14 days between the notice mentioning legal action and the communication preceding it. He had attempted to trace the matter on which the complaint was founded and the only likely case was that in which a consumer had confused an overdue account with a current one.

GAS EQUIPMENT AT TRAINING COLLEGE

AN interesting gas installation has recently been completed by the South Eastern Gas Board at the William Booth Memorial Training College, Denmark Hill. This fine college, which covers an area of 8½ acres, was built in 1929 and opened by the Duke of Kent. It provides accommodation for over 400 Salvation Army cadets, and at present the International Headquarters of the Salvation Army are centred on this building, following the loss of their offices in the City.

Although the bulk of the kitchen apparatus is fed from the central steam installation, consideration has recently been given to modernising one section of the kitchen, and two 'Main' DYW/2/62 double oven ranges and one 'Main" OT.30 toaster, mounted on a high stand, all in mottled enamel finish, have been fitted. The results have been so satisfactory that consideration is being given to the addition of further gas equipment.

It is of historic interest to record that the College is a tribute to the vision and energy of the late General Bramwell Booth, who conceived the scheme of a training college as a memorial to his father, General William Booth, founder and first General of the Salvation Army.

The 400 cadets are accommodated in nine houses, and the college is complete with classrooms, lecture halls, and administration offices. In addition there is a large assembly hall which provides seating accommodation for 800 persons. The buildings are heated by a central boiler plant, and a network of conduits connects the various buildings and these have been provided to carry all services.

From information provided by the Training Commissioner we gather that the object of the College is to train cadets for officership in the Salvation Army, and the period of training at Denmark Hill is nine months.

GAS AT HOTELYMPIA . . . . Review of Notable Exhibits

IT is not much of an exaggeration to suggest that Hotelympia—or to give it is full title, the Hotel, Restaurant and Catering Exhibition—is a gas show. There is gas in plenty, and in the field of kitchen and stillroom equipment gas wins by something like eight or nine to one. But despite this preponderance of gas-operated equipment, it would be a serious mistake to underestimate the gradually increasing part played by electricity. There is little more electric equipment at Olympia this time than during the last exhibition in 1949, but much of it is better.

This exhibition, which opened on January 23 and will remain open until February 1, is full of interest. Sponsored by 15 national associations and representing all branches of the catering trade, Hotelympia is an important landmark in the hoteliers' world. A particular feature is the Salon Culinaire which, in its spacious pavilion on the ground floor, comprises two separate though related exhibitions. There is the table d'honneur, which displays the carefully selected work of the country's leading chefs as examples to the trade and general public of the heights to which culinary art can rise; and there are the entries in the competitions, in 26 classes, which are being shown in groups throughout the nine days of the exhibition. The world cocktail shaking championship is another well-known event in the exhibition's programme

Particular mention must be made of the emphasis placed upon education. Due to the co-ordination of the Hotel and Catering Institute, there are now 28 hotel and catering schools, while part-time courses in hotel and catering subjects are held at 81 technical colleges and schools. Visitors to the demonstration theatre have the opportunity of witnessing the type of training given, for continuous demonstrations in various types of work are given daily by instructors and students from various colleges. Gas is again to the fore, and the Gas Council has equipped an admirable model kitchen. The appliances include a Benham two-oven range with one open top and one solid top, a Benham '24' salamander, an Electrolux refrigerator, a Parkinson 221 'Unita' hotplate, a Radiation, 40/3-tier confector pastry oven, and a De La Rue No. 2 'Empire' lagged storage set with a 34 gal. storage tank.

Gas Council Exhibit

And so to the stands. In this review we follow our usual custom of dealing first with the Gas Council stand, and then describing the trade exhibits in alphabetical order.

In some ways the Gas Council stand (*Nos. 14, 39 and 40*) is a distinct change from recent designs. It is pleasing in appearance and we are pleased to note the incorporation as a focal point of a small but comfortable lounge where those interested can discuss their catering problems at ease. A representative selection of modern gas and coke appliances is displayed, embracing equipment for cooking in kitchens of all sizes and in snack bars and service rooms, together with appliances for water heating and space heating.

Among the appliances on view the Bratt Colbran 'Junior' luminous panel heater, suitable for the overhead heating of a room from 8 ft. to 10 ft. in height, is of interest as this brings the advantages of overhead heating to a room of smaller area than was possible with the original larger model panel heater. A lagged storage set, 'Rex' size 2D series, with an 80-gal. capacity tank is another appliance which is capable of providing all the hot water required for a large-scale catering establishment. An Esse 'Major' coke-burning cooker, which will cook for 80 to 100 persons, comprises two ovens with solid-top hotplate, and three asbestos-lined cover tops which enable heat to be conserved. Further comment on the display of these appliances appears in our editorial columns.

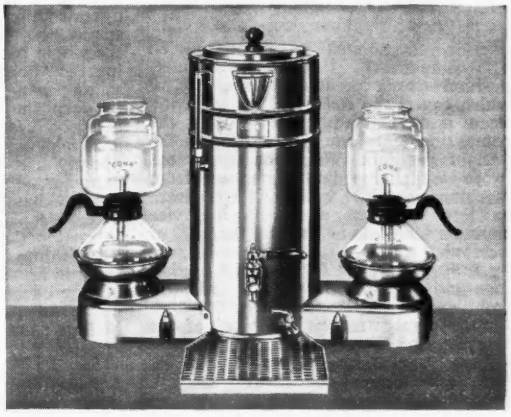
Trade Stands

Stand 167. The 'Adastra' range of catering equipment by **Adams & Son (Engineers), Ltd.,** covers gas and steam heated hot cupboards and bains marie in a wide variety of sizes and finishes, fish frying ranges and service counters. The No. 212 hot cupboard incorporates a flush top thermostatically controlled dry heat bain marie. An even temperature is maintained in the pans over an indefinite period and there is no danger of the food being dried up. With this type of bain marie there is no trouble with escaping steam or with water becoming foul or running dry. Other novel features are also incorporated which should be of great interest to those looking for reliable service and good appearance in such an appliance at a reasonable price. Another attraction on this stand is a range of small hot cupboards suitable for the smaller catering establishments and private hotels.

Stand 88. **Albright & Wilson, Ltd.,** demonstrate some of the advantages of using 'Calgonite,' which is made in three grades, 'M' for machines, 'H' and 'X.L.' for hand. It is shown that these products economically solve the problems of grease, hard water film and lime deposits which clog sprays and the moving parts of dishwashing machines; that they ensure absolute cleanliness of crockery and glassware; and that they will not corrode silver or aluminium. Other problems dealt with are the applications of calgonised detergents in cleaning dairy utensils, tea and coffee urns, beer engines and pipes, refrigerators, catering and food manufacturers' equipment where freedom from dirt and grease is essential.

Stand 118, 119 and 120. **G. F. E. Bartlett & Son, Ltd.,** display a representative range of equipment including hot cupboards, both heavy duty and 'Sterling,' round and rectangular boiling pans, fish fryer, steaming oven, heavy duty and C.R. type, a snack bar counter, bulk water boiler, various types of tea service trolleys with multipots, etc. Of particular interest is a new coffee making machine known as the 'Filtor.' This appliance will only boil water as and when it is needed, and a new technique brings out the most aromatic flavour; since the 'Filtor' can use very finely ground coffee, extraction is at maximum; a cup of coffee can be produced using only 6 oz. to the gallon. The coffee is brewed at the rate of one quart in 90 seconds. It is claimed that the 'Filtor' cannot get furred up. The removable gas burner is fitted with an 'Aeromatic' injector automatic gas valve with safety lock pilot. Maximum gas consumption is 150 cu. ft. per hour.

Stand 101-4. The principal exhibit on the stand of **Benham & Sons, Ltd.,** is a composite gas wall range fitting, incorporating several entirely new design features. Exceptionally highly efficient burners and a special 'fry-top' are two features of the latest solid-top range units which form part of the fitting. Included also are working tables, bain

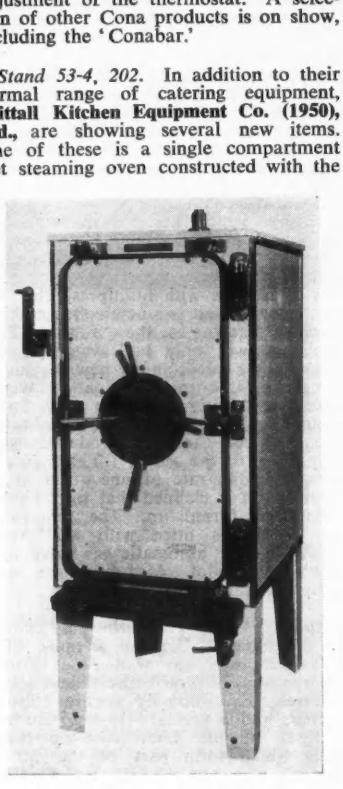


The 'Conacaf,' one of the principal exhibits on the stand of the Cona Coffee Machine Co.

marie, deep fat fryer unit, underfired silver grill, and an elevated salamander; the latter is mounted on a pot rack running over the length of the combined fitting. A hood is fitted over the complete unit, and a feature of the appliance is adequate space. A battery of Benham steam tilting kettles, a 'Hercules' dishwashing machine and a comprehensive range of catering utensils are among other items exhibited. In design this is one of the finest stands in the show.

Stand 192. Regular exhibitors at Hotelympia the **Cona Coffee Machine Company** show their latest model, the four bank 'Conacaf,' a handsome unit which incorporates a milk urn with thermostatic control; the urn can be used if desired for coffee storage by a simple adjustment of the thermostat. A selection of other Cona products is on show, including the 'Conabar.'

Stand 53-4, 202. In addition to their normal range of catering equipment, **Crittall Kitchen Equipment Co. (1950), Ltd.,** are showing several new items. One of these is a single compartment wet steaming oven constructed with the



Crittall Wet Steaming Oven.

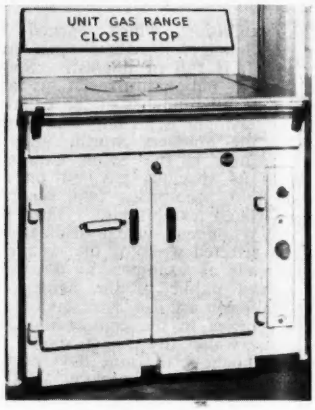
interior, trays, etc., of stainless steel. The compartment is controlled by a 2-position crank handle control valve which covers the steamer door when the steam is on and automatically vents the compartment to atmosphere when in the upright position. The door is secured by 6-way sliding bolts operated from machined central worm with capstan handles. Another new item is a service counter designed to reduce the use of steel and stainless steel to a minimum by utilising plastics for the cold section tops and shelves and for the complete front and tray shelf. On *Stand 202* continuous demonstrations are given of the catering size (27 pint) 'Presto' pressure cooker, suitable for use on any type of stove. Of aluminium construction with machined base and fitted with patent locking cover and all safety devices this cooker saves 75% cooking time, 60% fuel, and ensures retention of all nutritious food values. It brings to the caterer all the advantages that have previously been confined to the home.

Stand 160-1. **Crypto, Ltd.,** exhibit a considerable amount of gas equipment, one of the most interesting items being a fish frying range now being manufactured by the company with several interesting features. It is normally fitted with 'Davis' burners, full-on consumption being 150 cu. ft. per hour per pan. Where the thermostatic control is required, 'Barter' burners are fitted, with De La Rue thermostats and relay valves. A fair average with town gas models is stated to be 60-70 lb. of chips per hour, or 8.9 lb. of chips every 7-8 minutes (including recovery time) per pan. Also on the stand is the 'Coffeemaster' double-urn unit, made by Ewart Catering Equipment, Ltd., with a capacity of 84 small cups at one infusion and the impressive 'Drinkmaster' which can maintain a continuous supply either or both of tea and coffee and provides a total storage capacity of 20-gal., with a central boiling unit giving additional boiling and hot water for individual teapot service. Any hot beverage can be made in the stainless steel-lined 5-gal. thermostatically controlled side urns and maintained at correct serving temperature with minimum gas consumption.

Stand 89, 90. **Dawson Bros., Ltd.,** exhibit their various models of dishwasher which provide for washing up after 50 to 1,000 meals. Model A is semi-automatic, Model B for large kitchens and canteens is fully automatic and requires two unskilled operators, and Model CA is also fully automatic, and provides for two separate washes as well as the final sterilising rinse. The capacities of the three models are, respectively, 3,000, 6,000, and 10,000 pieces of crockery per hour.

Stand 23-4. **Euk Catering Machinery, Ltd.,** are again in their usual position practically opposite the main entrance to the exhibition from Hammersmith Road. The 'Visi' fish frying range is designed for an individual service which permits the customer to select his own piece of fish from among those displayed on a fish rack, under glass. The fish on show is maintained in perfect consumable condition by radiant heat, which allows free air circulation and overcomes the old problem of storage. This gas operated model has studded pans which spread the heat from the burners over the whole base of the pan, thus eliminating the 'hot spots' in cooking and permitting pan bottom frying, as opposed to deep fat frying, although the latter may be used if desired. The kitchen and institutional range is designed to operate without the old fashioned hood extractor, both steam box and combustion chamber outlets being constructed to ensure a far more efficient system of extraction than is possible with a hood. The folding flat top lids of the pans also assist in preventing steam or fumes entering the kitchen. Other appliances include dish washers, hot closets, bains marie, boiling pans, etc.

Stand 147. In addition to a representative range of pastry ovens, heavy duty cooking ranges, and a new gas steaming oven, the **Falkirk Iron Co., Ltd.,** exhibit an interesting new unit cooker, the G.11. Designed for medium size catering, this has a well-lagged oven with removable hangers to take, on runners, three grid shelves and two intermediate shelves. The oven has a bottom flue outlet, hooded so that the outlet cannot be blocked when baking tins are placed in the oven. The oven burners are of the removable atmospheric type, obtaining 400°F. within 30 minutes of lighting.



New Falkirk Range.

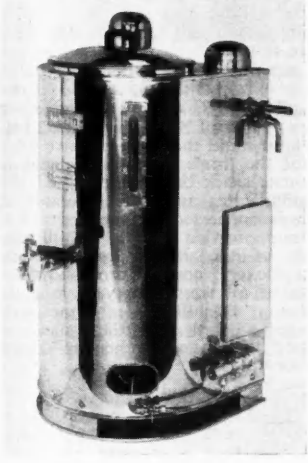
Doors are of the skin type or, alternatively, drop-down. The door fasteners are spring-loaded and, in the case of the swing type doors, these can be opened from the closed position to a minimum of 150°. The closed type hotplate has heavy removable cup ring and side plates, finned to give maximum efficiency and heat pick-up. The injector is 'Aeromatic,' and the single burner is controlled by one cock. The hot plate burner cock is fitted in a control panel on the side of the oven; this panel is readily removable, and in it is also incorporated the oven thermostat, which is combined with the control cock to the oven. The hotplate gas consumption is 80 cu. ft. per hour with a rating of 40,000 B.Th.U.

Stand 235-6. **James Farquharson & Sons, Ltd,** exhibit an excellent display of heavy equipment in addition to their well-known range of steel sinks, draining boards, hardware, furniture, crockery, etc. Heavy appliances include a double oven range, steaming oven, boiling pan, and fish fryer. The firm stresses the fact that a prominent feature of their service is that the customer can buy from the one firm, at competitive prices, everything required and can thus depend upon dealing through the contract with a firm anxious to see that satisfaction is obtained in every respect.

Stand 15-6.—**W. N. Froy & Sons, Ltd.,** exhibit a range of 'Brunswick' hygienic catering units, including the well-known deep fat fryer, the steaming oven, gas griller, boiling pan, and, of course, the hot service equipment for which Froys are recognised specialists. An 'Aquafont' tea and coffee set is incorporated, and this is fitted as a working model to prove its supremacy in this sphere. In addition, part of the stand, the office and a very atractive cocktail bar, are shown built of 'Luma Bloks,' a new plastic interlocking brick for which Froys are distributors.

Stand 1-4. One of the most interesting items on the stand of **Gardiner & Gulland, Ltd.,** is the 'Alacarte' hot closet. Made in three sizes, this appliance has a wet heat top bain marie, dry heat hot closet, and the interchangeable top equipment system allows for day to day changes in menu. A new safety multiple gas-cock controls the main gas flow to the single burner. Adjustable thermostatic control allows varied setting of the hot closet and bain marie against fluctuations in service demands A unique design built-in steam generator is fitted below the bottom shelf giving uninterrupted cupboard capacity, and complete steam generating equipment, gas burner, shelves, doors, and top equipment are all readily removable for cleaning. To increase service space a stainless steel hotshelf 10 in. wide can be provided at front of top (customers' side) if desired.

Stand 86 and 105. **Jackson Boilers, Ltd.,** have a new product in their independent milk heater which is thermostatically controlled, stainless steel lined, and has a holding capacity of 3 gal. Also shown are 'Jackson' café fountains and boilers, constructed to deliver positively boiling water for tea making, and fitted with flanged Pyrex-lined milk and coffee

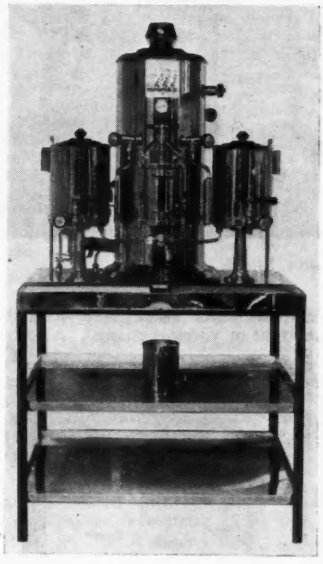


Jackson Independent Milk Heater.

urns, incorporating the 'Filtomaton' system of coffee making. The 'Teatomaton' is fitted with divided container and two infusers, and the 'Jackson' water heater is thermostatically controlled and chromium plated, for general use or dish washer service.

Stand 155-6. On an impressive stand **R. & A. Main, Ltd.,** feature a 'Planned Kitchencraft' until incorporating plans and photographs of various outstanding installations. Appliances featured include a four-oven central range, roasting ovens, boiling pans, wet steaming ovens, etc. The deep fat fryer has a large capacity one-piece frying pan of heavy cast iron, a cool crumb-well being an important feature of the pan. The enamelled casing is fully insulated and the whole is mounted on cast iron legs. The temperature is controlled by 'Mainstat' and the unit is complete with main and pilot taps, gas burner with air disc and calorific value adjuster. There is a temperature guide and oversplash shield on the front. Included on the stand are 'Thermain' Nos. 2 and 15.

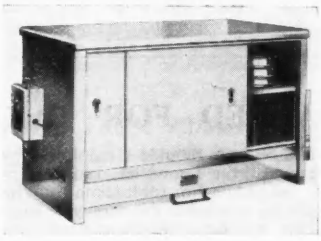
Stand 74. **Minimax, Ltd.,** are exhibiting their standard tea and coffee-making equipment, the working model being type SP/A46. This consists of a 12-in. automatic boiler with an output of 200 pints



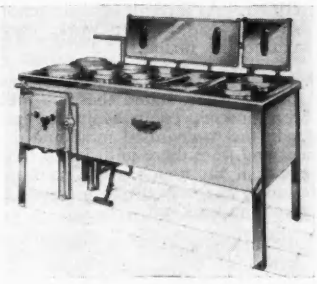
'Minimax' Tea or Coffee Set

of boiling water per hour; the infuser gives an output of 72 pints of tea per hour and 48 pints of black coffee. Other exhibits include low pressure boilers and large tea makers.

Stand 165. **J. Mollett, Ltd.,** show several items of interest, among them the auto-steam bain marie with capacity for



Mollett Auto Steam Hot Cabinet.



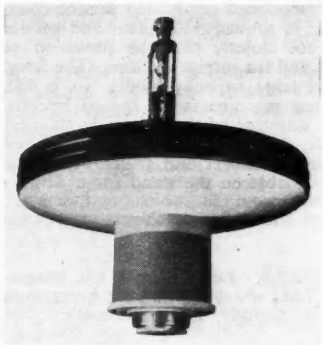
Mollett Bain Marie.

100 plates, hydraulic plate-lifting equipment operated by a foot pedal, seven stainless steel food containers, and a gas consumption of only 46 cu. ft. per hour. The auto-steam hot cabinet has a gas consumption during the initial heating up period (45 minutes) of 20 cu. ft. per hour, and cut-down consumption of 10.9 cu. ft. per hour.

Stand 153. **Moorwoods, Ltd.,** exhibit a considerable amount of gas-operated equipment including a two-pan fish fryer, double oven range, steaming oven, and hot closet. Several items of steam heated equipment are also shown.

Stand 113. **Charles Portway & Sons, Ltd.,** are again showing their portable confectioners' ovens. They are sectional to facilitate handling in confined spaces, and to enable them to be used up and down stairs. The gas oven has incorporated many new devices, such as the luminous burner, running the whole width of the oven, with one single control for both gas and air, and a clean, easy way of lighting by pilot jet. The ovens are finished in galvanised sheeting and black paint.

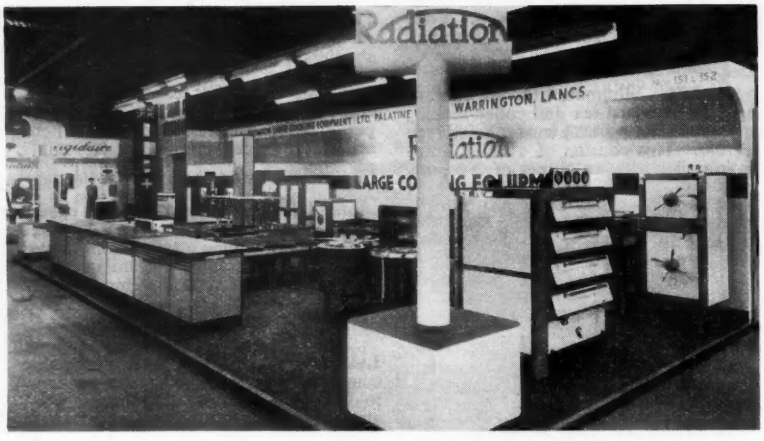
Stand 162. **Radiant Heating, Ltd.** exhibit an excellent range of space heaters, toasters, etc. Included are the



'Golden Glow' Heater.

'Golden Glow' heater for heating restaurants, canteens, etc., the 'Floortherm,' a gas convector with clean lines, finished in vitreous enamel, and the 'Supertherm,' a new high intensity space heater. Among the catering appliances the most interesting are the Radiant Heat salamander, an efficient horizontal griller fitted with flameless radiant burners, the 'King' toaster, first introduced at the last Hotelympia, and a sugar boiler.

Stand 151-2. On their usual handsome stand **Radiation Ltd.** exhibit a large selection of their appliances. Of particular interest is the new 'Stratford,' and 'Ministry' ranges, the latter modelled on the 'Chester' range principle but incorporating special features required by the Ministry of Works. The new model 'Lune' boiler incorporates the following interesting features: Special drip-proof high efficiency type 'Rado' burner, with fixed venturi providing flame stability at low consumptions; swivel pilot working in conjunction with the interlocking gas tap; pan of 20 gal. working capacity in bower-barffed cast iron,

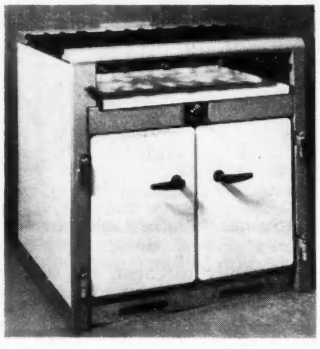


A view of the Radiation Stand.

aluminium alloy or stainless steel; and floor clearance 15¾ in. for ease of cleaning and burner accessibility.

Stand 19 and 32-4. **Wm. Still & Sons, Ltd.,** exhibit a complete range of boiling water and coffee-making apparatus, each set being shown complete with special pattern counter units. A range of newly designed gas heated service countering is shown, with plain and service top hot closets, plus the provision of salad and tea service sections. The latest model large capacity model No. 6 dish washing machine is of special interest, being constructed throughout in stainless metal. Also shown are the gas-operated 'Greville' toaster and griller. Facilities are available on the stand for a demonstration room in which two sets of boilers and coffee machines are operating.

Stand 7-9. **James Stott & Co. (Engineers) Ltd.,** show several new items such as the sturdily built automatic food steamer, panelled inside with stainless birmabright or vitreous enamel. Also on



Radiation 'Stratford' Range.

show is a new thermostatically controlled 'Autofry' with built-in chip boxes. For the service of food there are some special new hot cupboards with flush fitting panels with all controls contained inside the formed angle. The sliding doors are the lift-out type and are extremely light, being constructed of 'Delaron' laminated plastic, sheet-steel backed. The hot cupboards are heated with the new matt type elements which give better distribution of heat with more uniform heating for a lower consumption of current. For tea and coffee making a whole galaxy of water boilers and café sets is displayed of which the main feature is an industrial tea-making unit.

The 'Lune' Boiler.

Stand 122-3. A very handsome exhibit is that of **Sumerling & Co., Ltd.,** on whose stand the representative selection of the firm's products includes an up-to-date snack bar counter, fitted with a 'Bunhill' tea and coffee fountain set which is connected to supplies and in operation, service tables and hotcupboards of the latest design, various steam cookers; counter urns and water boilers of all sizes and types, and the popular 'Bunhill' tea measuring machines. Part of the stand is arranged with a comprehensive display of sundry utensils.

A Fire Guard Poster

The Gas Council has made a presentation to the Royal Society for the Prevention of Accidents of 5,000 posters bearing the caption 'Warm the Child but Guard the Fire.' The poster is in colour and shows a modern gas fire, with guard, in front of which a small girl and boy are playing. Buildings blocks on the ground carry the letters G A S.

The poster will be distributed by the National Home Safety Committee to local safety committees, 34 of which have now been formed in various parts of the country, and to education authorities, medical officers of health, women's organisations, and other groups.

The poster was recently shown to members of the Home Safety (General Purposes) Sub-Committee of the R.S.P.A., of which the Gas Council's Home Service Officer is a member, and the appreciation of the Council's practical co-operation was warmly expressed.

SACKED FOR TAKING FRENCH LEAVE

ELEVEN iron moulders employed by Cannon Iron Foundries, Ltd., Deepfields, Bilston, who took time off on January 16 to attend the replayed football cup tie between Wolverhampton Wanderers and Manchester City, were told next morning that they had been dismissed. They had asked for leave to attend the match and permission had been refused. As a result of their action 24 other men had to stop work; they, too, went to the match.

Mr. A. F. Oatley, Chairman and Managing Director, stated that the men had been making components for gas cookers in the mechanised moulding department and were there until lunch time on the day of the match. The mechanised foundry was brought to a standstill because of the walk-out.

On the morning after the match the men tendered their apology to the management through their shop steward and were told that this was not acceptable: 'We have decided that there will be no change in our decision that the 11 men are dismissed,' said Mr. Oatley.

Most of the men, some of them Irishmen, had been with the Company for about five years and their output was between 460 and 470 moulds per day. Four of the vacancies created by their dismissal had been filled by Friday morning, two by outside volunteers and two by men from inside the works, one of whom was a truck driver who used to bring supplies to the department in which the men worked.

On behalf of the men it was stated that they expected suspension or reprimand, and that they had offered to make up the lost time at flat rates. Five of the 2,000 employees of a Wolverhampton firm who went to see the match were suspended for three days.

AMERICAN SPOTLIGHT

Items of Topical Interest from the Contemporary Technical Press of Canada and the United States

MINIMUM SERVICE STANDARDS

THE report that the organised gas industry, as represented by the directing boards of both American Gas and Gas Appliance Manufacturers Associations, is about to tackle seriously and for the first time the defining of appliance service responsibility is a piece of news that enlightened gas men will loudly applaud.

The mechanism of the move has not been officially defined, by either A.G.A. or G.A.M.A., but it is generally understood that the president of the utility association will appoint a top flight committee of gas men to work with a similar policy committee from the manufacturers' group.

The manifest advantages of a national policy of minimum service standards is by now widely recognised. The gas industry will benefit, the gas appliance business will benefit, and, what is of the greatest importance in the long run, the millions of gas consumers will benefit. (*American Gas Journal.*)

* * *

THAT PILOT LIGHT

ICE cubes in the making give off more heat than the average domestic gas range's pilot light. This is one of the many 'believe it or nots' used in the Gas Appliance Manufacturers Association national campaign to debunk a popular belief that the pilot throws off excessive heat. G.A.M.A. experts figured that the pilot light puts out only 200 B.Th.U. per hour.

In the same time, the freezing ice cubes throw off 300 B.Th.U. People get hot under the collar at a rate of 350 B.Th.U. an hour in a card game. A woman mopping the floor stirs up 759 B.Th.U., and a couple doing a rhumba cook up about 1,700. (*Gas Age.*)

* * *

80,000 HAMBURGERS

HOW to cook 80,000 hamburgers at one meal! This was the problem handed to the Dallas division of Lone Star Gas Co. during the State Fair of Texas in October. It was to be Rural Youth Day at the fair and kids were to be there from all over Texas.

The committee in charge asked John E. Moore, industrial engineer of the Dallas division, how to fry 80,000 hamburger patties for the voracious small fry. Mr. Moore and his assistant, John Cummings, drew plans for burners and griddles and a local plumbing company helped to build them. They built 10 griddles, each 10 ft. long and 4 ft. wide. That's 400 sq. ft. of griddle space. Each griddle had 8 burners made of 4 ft. sections of 1½-in. pipe threaded at the ends. Plumbers drilled 121 orifice holes into each burner or a total of 9,680 holes. The burners were attached to headers and a 2-in. pipe fed the gas from an elevated line that ran along the top of each of the griddle stands. Each griddle had a small bun warmer heated by burners from old gas ranges.

The farm kids poured out of 1,800 school buses and hit the hamburger stands like a swarm of locusts. But the gas cooked sandwiches were ready for the biggest outdoor meal ever served in these parts. (*Gas Age.*)

* * *

NATURAL PIPE COVERING

A FREAK of nature has been reported by the United Natural Gas Company of Oil City, Penna. The unusual sight of a pipe line passing through a growing tree may be seen in Pinegrove Township on a tract of land known as the Powell farm.

The pipe line, 3 in. in diameter, connects a United Natural well to the company's gathering system. The well was drilled in March 1890. The exact date the line was laid is not known. In the early days of the company it was the general practice to lay gathering lines on top of the ground, except when fields were cultivated; also to follow the shortest route from well to a main artery.

It is assumed the tree was a sapling touching or standing close to the line when it was laid. Expansion and contraction of the metal resulted in the line moving against the tree causing a wound, normal healing of which was prevented by pressure of the pipe against the tree. Eventually, the tree's growth encircled the pipe. The company estimates that the tree, a white oak, is at least 80 years old. (*American Gas Journal.*)

* * *

STEEL FROM EUROPE

EUROPEAN-MADE steel pipe is now being used by the Manufacturers Light and Heat Co., Pittsburgh. Being unable to secure sufficient pipe from mills in this country, the gas company went on the world market.

In recent weeks ocean freighters have been bringing pipe to this country from Belgium. More than 30,000 ft. of 10¾ in. steel pipe was unloaded into barges in the lower Mississippi River and towed to Baden, Pa. Rail shipment was then made to the gas company's pipe yard at Washington, Pa.

More than 21,000 ft. of this type of pipe was unloaded in Baltimore harbour and shipped by rail to the pipe yard. More than 230 metric tons, or in excess of 47,000 ft. of 4½ in. steel pipe is coming to manufacturers from a pipe mill in Germany. The company anticipates receiving about 200,000 ft. of 6⅝ in. steel pipe from Germany. (*American Gas Journal.*)

FLAME FACTS

A NEW and positive force is to be launched in the promotion of commercial gas cooking. The Food Service Equipment Committee of the A.G.A. Industrial and Commercial Gas Section is about to commence the monthly publication of *Flame Facts,* a four-page newsletter designed to carry the gas story to the men who specify and to those who sell volume cooking equipment.

The facts and data to be published in each issue will provide an accurate source of information, not only to meet the arguments of the competition in those areas where campaigns against gas are more aggressive, but also in those areas where it is liable to develop at any time. The publication will serve as an incentive to continue the promotion of gas sales and will help to keep gas sold. (*A.G.A. Monthly.*)

* * *

ELECTRIC JUDGES PICK WINNER

A GROUP of Missouri electrical people judged the Empire District Electric Company's baking contest and awarded first prize to a competitor who learnt her recipe at the *Monett Times* annual cooking school from the home service director of a gas company. And adding insult to insult, the winner baked her butternut bread on—you guessed it—a gas range! (*Gas Age.*)

* * *

PRESS RELATIONS

'HOW to Work with the Press' is the title of a booklet recently prepared by the Columbia Gas System. Making a favourable impression on the public is one of the gas industry's most challenging problems. The keystone of good public relations is good press relations. For this reason, Columbia Gas System has prepared a lively 16-page booklet for its employees which outlines the art of getting along with the key men in press relations—local newspapermen.

The booklet is a handy pocket manual, explaining how press relations affect the gas business. It introduces the reader to a typical reporter, the kind of office he works in, the editor who supervises his work. It explains what kinds of stories are of greatest interest, stresses the importance of co-operating, giving facts clearly and concisely.

Common sense is the booklet's keynote. It shows the newspaper office not as a mystery, but as a community service. The manual's last chapter, 'A Few Do's and Don'ts,' clarifies any misgivings and questions which may remain in the employee's mind. The booklet emphasises that good Press relations *now* are vital to public relation's success in the future. (*A.G.A. Monthly.*)

CONSULTATIVE COUNCILS IN SESSION

West Midlands Street Lighting Charges

STREET lighting charges at Kidderminster were the subject of a strong protest made by the local council at a meeting of the West Midlands Gas Consultative Council on January 14. Councillor W. H. Malcolm (Coventry) presided. Alderman Samuel introduced a deputation from the Town Council.

Correspondence was submitted, starting with a letter from the Town Clerk of Kidderminster 'protesting in the strongest possible terms at the unreasonable increase in the charges for street lighting over and above that for the year ended June 30, 1950.' In support of the protest it was stated that such charges were in accordance with the lowest industrial tariff and that the council was being required to pay 12.8d. per therm plus an annual maintenance charge believed to be between 20s. and 30s. a lamp. Enquiries had been made and it appeared that the lowest charge for gas street lighting in the country was 6.8d. per therm and the highest 14.17d. per therm, the average being 9d. to 9½d. It was suggested that an industrial tariff was not appropriate for street lighting and that other towns were not so charged and in fact paid less. The charges were apparently by no means consistent throughout the area.

The Board replied that when the question of public lighting in Kidderminster was under consideration in 1950, because of the impending termination of the contract entered into in 1945, it ascertained, from the Engineer and Manager, who was in office in 1945, that the Gas Company was then competing against severe electricity competition and as they were entitled to do quoted accordingly. The price quoted for gas at 4d. per therm was considerably below the then cost into holder and ignored other inescapable costs, such as distribution, rates and capital charges.

Substantial increases in the price of coal, gas oil, other materials and wage rates had taken place and had materially raised production costs. As the Board had set in hand a comprehensive review of gas tariffs throughout the West Midlands which was likely to include a standard principle on which public lighting charges should be assessed, it was decided as an interim measure to charge at the lowest rate charged to any consumer in Kidderminster, which accorded with a pre-vesting practice in Birmingham.

In a letter to the Chairman of the Consultative Council the Borough Engineer said the Kidderminster Council agreed that the prices fixed in 1945 at 90s. per lamp per annum (all night burning) and 85s. 6d. per lamp per annum (half night burning) were now low and should be revised but contended that the increase asked for was unreasonable.

Alderman Sir George Eddy, on behalf of the deputation, said it was considered the charges were too high in view of the facts. Previously they paid 4d. per therm but they were now asked to pay 11.587d. per therm, an increase of 189.6%. Formerly they had to pay £4,395 but this year they were called upon for £6,754 an increase of 54%.

It was thought that the tariff for street lighting should not be on the same basis as industry and that as a local authority they should be given some preference which he contended the Board had power to do.

Other members of the deputation spoke against the proposed new charges. It was also desired to speak on the new tariff structure but the Chairman ruled that that could not be gone into as it was not yet before the Council.

Several speakers pointed out that they had not got all the facts and it was agreed to refer the matter back to the Board for investigation and for a further reasoned reply to be prepared.

The Gas Board informed the Council that the Gas Council was recommending to area boards that they should adopt a standard policy with regard to the provision of guards for gas fires, as soon as the necessary materials become available. It was proposed that all new portable gas fires, and fires designed to be built in above the hearth, should be sold complete with an integral fire guard which conformed to British Standards, as specified in the letter. The note added that all new hearth fires should be provided with a guard if a customer that in the case of hearth fires there was protection afforded by the kerb of the hearth, and it was felt that only people with young children would require a guard for such fires.

The Chairman said the Consultative Council had taken up this matter, and they were glad that the Gas Council had been able to ensure that guards would be an integral part of gas fires.

Richard Tiles Ltd., of Tunstall, Stoke-on-Trent, wrote expressing thanks for affording a supply of town gas for their Brownhills factory at short notice. The trouble with the firm's gas producer plant had placed them in serious difficulties, and without the Board's help they would have suffered loss of production and spoiled ware. The Board's assistance eliminated all that apart from a negligible loss of output which they would be able to make good in a few days.

The Chairman said it was pleasing to receive such an appreciation, and it was gratifying to be able to put on record that an important customer was more than satisfied.

Eastern: Plea for Price Stability

A FURTHER increase in the price of gas in the near future was foreshadowed at a meeting of the Eastern Gas Consultative Council at the Connaught Rooms, London, on January 21, under the Chairmanship of Alderman R. Turner, J.P.

Alderman Turner recalled that soon after the last meeting of the Council he circulated to all members a letter informing them that the Eastern Gas Board had conferred with him on the question of the then pending increase in the cost of coal. At that time the Board was on the point of announcing a general increase in the price of gas, and when it became known that coal was going up it met again and decided that it would be wise to make an additional increase in the price of gas. It based its calculations on an anticipated rise in the price of coal of 3s. per ton which, allowing credit for the increased price to be obtained from the sale of coke, would entail an increase of a halfpenny per therm on all gas sold. He was in a difficult position and he had to make up his mind there and then, and he told the Board that if the halfpenny increase was applied to everyone he did not think the Consultative Council could possibly object. He was assured that the increase was to be general, even to the extent of being applied in places where a 'ceiling' price had been fixed.

The Council signified its endorsement of the Chairman's action.

The Chairman said that subsequently he had a letter from the Board informing him that the price of gas would have to be considered again because instead of the price of coal having been raised by 3s. the increase was 6s. 8½d. per ton, plus an additional 10% on freight charges. The Board was now studying estimates, but it was his duty to warn the Council that the price would have to go up again to cover the increased costs.

Members of the Council expressed the view that there was nothing more alarming to the public than to be told immediately after one increase that another was imminent. The Board, it was suggested, should not have been so optimistic as to under-estimate the rise in the cost of coal to the extent that it had done, and it should strive, even at the risk of having to carry forward a loss incurred in the interim, to ensure stability of prices for at any rate six months ahead. Rapid fluctuations in the price of fuel created serious difficulties for industries engaged in export trade, and anything the Board could do to stabilise the price over a fixed period would be appreciated.

Arising out of a reference in the minutes to the question of freedom of choice of fuel for tenants of council houses, the Chairman told the members that the Newmarket Council had decided

to adhere to its present policy of providing only electricity in new houses. There were only three parishes in the district supplied with gas. Electricity was considered to be essential, and the Newmarket Council felt that to provide gas in addition at a cost of £4 per house, unnecessarily increased the cost of houses, and in these days costs should be kept as low as possible. The Council had no objection to tenants having gas installed at their own expense; in fact, this had been done in many houses during the past year. In reply, said Mr. Turner, the Board had pointed out that to defer the installation of gas supplies until after the houses had been completed entailed an unreasonable increase in the cost.

The Loddon Urban District Council housing committee had no objection to the installation of gas services so long as no charge was made on the Council.

Alderman Turner explained to the Consultative Council that gas was being produced at a loss at Loddon. The price the Board was able to charge did not cover the cost of production. Therefore, the Consultative Council might not be doing the Board a very great service by trying to persuade the local authority to reconsider the matter at present.

In discussion members pointed out that ultimately the consumer paid for the installation, whether it was done through the local authority, by direct charge on the consumer, or on a 'free' basis, in which event the cost was incorporated in the price paid for gas. The real advantage lay in providing the service while the houses were being built. In some instances a 'subtle' tariff offered by the electricity board placed gas at a disadvantage with regard to price, particularly in view of recent and prospective increases in price, and it was difficult to understand a national fuel policy that did not in fact exist. Attractive tariffs were undoubtedly influencing many people to use electricity in preference to gas without regard to the really economic use of the nation's fuel resources.

It was ultimately agreed to adhere to the policy of urging all local authorities to afford freedom of choice to Council house tenants by installing both gas and electricity while the houses were being built.

'Fantastic Increase'

Attention was drawn to a letter from Mr. H. B. Paten, of Peterborough, protesting against the new tariff which was advertised early in December, on the ground that Peterborough appeared to have been called on to carry a greater increase than other districts. Taking the basic flat rate for Peterborough, which was being increased from 16d. to 18d. per therm, it appeared that since nationalisation the figure had moved from 10d. to the new figure of 18d., an increase of 80%. Mr. Paten was puzzled at this 'fantastic increase' in the running costs at Peterborough where things were surely much the same as they were two years ago. 'It is surely time,' he wrote, 'that Consultative Councils made a determined stand to press very strongly the case of the consumer instead apparently of meekly agreeing to every move by the Gas Boards.'

Alderman Turner said he had replied to Mr. Paten pointing out that the Board had to raise the price from 10d. to 13d. forthwith on vesting day to avoid a considerable deficit, and the real increase since 1949 was 38.4% instead of the 80% quoted by Mr. Paten. The present cost of gas into holder at Peterborough was slightly greater than that at Cambridge although the price was still below that charged at Cambridge.

The correspondence was referred to the Tariff Committee.

On the report of the Norwich Divisional Committee, Councillor C. H. Frewer raised the question of the proposed new large gasworks at Lowestoft. He understood that the ultimate aim of the Board was to supply gas from the new works over an extensive part of East Anglia and to close down some 20 existing works, including Norwich. He viewed the project with some alarm, particularly from the security point of view. If the capital charges in respect of the new works were to be added to the cost of gas the consumers would obviously have to pay more for their supplies. There was also the question of redundant executive staffs, for the new works would not need 20 managers. He assumed that under nationalisation there was no such thing as staff being sacked, but it might be an expensive business finding other jobs for them.

Councillor W. Farthing (Chelmsford) said that a deputation from Lowestoft had been to Chelmsford to see the new carbonising plant that was inaugurated last year, and to a large extent their objections regarding any possible nuisance from the works had been overcome.

The Council agreed to endorse the Norwich Committee's opinion.

Scottish Extension Projects

TWO major proposals for extending the gas supply in Glasgow and Edinburgh were intimated to a meeting of the Scottish Gas Consultative Council at Edinburgh on January 16. They will cost in all over £140,000. An estimated £90,000 is to be spent in linking up the undertakings of Glasgow and Paisley. This is really for emergency, said Mr. A. T. Morrison (Aberdeen), Chairman. If either plant required a major overhaul and there were a shortage of supply, Paisley could supply Glasgow and vice versa. This project would involve the laying of 6,500 yards of main, costing £56,700, and a new booster at Paisley, estimated at £10,000. The date when the work is to be undertaken was given as 1953-54, and it is subject to a grant from Civil Defence.

Plans for Edinburgh involve the erection of two water cooling towers in order to cut down the consumption of the city's water supply by Granton gasworks. Two 40-ft. high cooling towers to be built at Granton will be able to pass 200,000 gal. of water an hour. Work is expected to start this year and to cost over £51,000.

Granton gasworks is the heaviest single consumer of Edinburgh's civic water supply, using an average of 1,080,000 gal. a day—or the equivalent of a day's supply for a population of roughly 20,000.

The city Water Engineer has from time to time made representations requesting that less town water be used. It was stated to the Council that there had been difficulty in maintaining the supply, both in the volume and at the pressure required. Working difficulties were being experienced, and these would increase as additional gas-making plant was installed. At present there was no cooling system at the works, and the heated water from the condensers ran into the sea. Cooling towers are expected to result in a substantial decrease in water consumption. They will be of timber, and of the same design as those at the Grangemouth oil refinery. It is hoped to have them completed in two years.

It is planned to spend over £61,000 on projects in the Dundee area within the next three years.

At Perth almost £10,000 will we spent on the reconstruction of railway sidings. Work is expected to be undertaken within the next two years on the provision of a £10,000 trunk main. Within the same period it has been agreed to spend £2,815 on the provision of mains to supply 25 houses at the extremity of Oakley, Dunfermline. A new gasholder has been approved for Aberfeldy. This will be of 100,000 cu.ft. capacity and will cost £11,330. Crieff is to get two additional retorts at a cost of £15,879. At Aberdeen the 50-year-old purification plant is to be replaced by new plant at a cost of £72,800. Mains to supply 1,400 houses at Aberdeen's Mastrick scheme are estimated to cost £23,000.

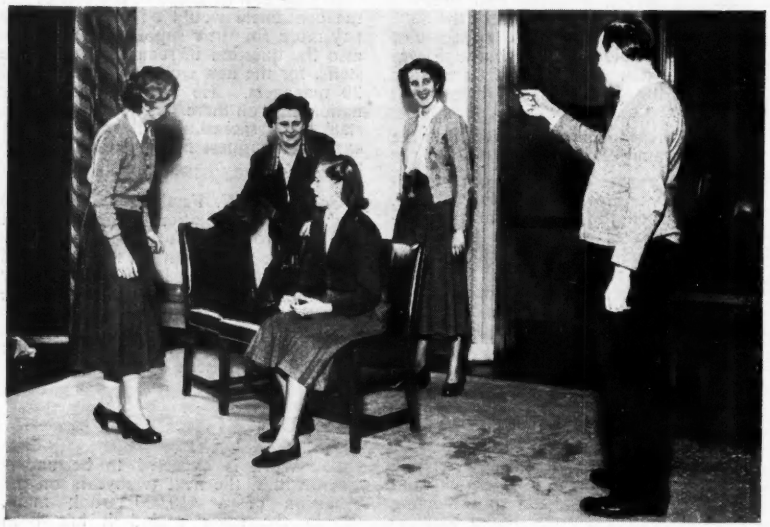
Referring to complaints about low gas pressure to consumers on the south side of Glasgow, the Chairman said that measures were being taken to deal with the matter. Difficulty was due primarily to the fact that the amount of coke oven gas available from a local iron foundry had fallen far short of what was promised. A new management had been established, as far as the coke ovens were concerned, and the matter was being inquired into.

It was reported in Glasgow the same day that a general deterioration in the plant at Govanhill Ironworks had caused a further reduction in the pressure of gas supplies for the South side of the city. About 3,250,000 cu.ft. less than normal was supplied on January 16, stated the Scottish Gas Board.

In reply to Councillor W. Campbell (Edinburgh) the Chairman said that one of the biggest problems facing the Gas Board was the shortage of cast iron gas pipes. Deliveries were three years behind schedule, and experimental steel pipes were being used. Housing schemes, he said, were given absolute priority. Councillor Campbell had said he understood that work on some Edinburgh housing schemes was being held up owing to a shortage of gas pipes.

It was Councillor H. D. Cowan (Ilford), not Councillor W. R. Cowen (Harrow), as reported last week, who, at the special meeting of the North Thames Gas Consultative Council on January 17 criticised the accounts of the Gas Board and unsuccessfully moved that the time was not opportune for an increase in the price of gas, suggesting that increased costs might be met by further economies.

A QUIET WEEKEND



'More expression this time,' says producer Alfred Badger at a rehearsal of the Gas Council Dramatic Society. The recently formed G.C.D.S. has met with enthusiastic support and has chosen Esther McCracken's 'Quiet Weekend' for its first performance at the Twentieth Century Theatre, Westbourne Grove, on February 13. With Dr. Badger (Industrial Relations Officer), left to right are: Marjorie Inskip (Coke); Helen Fox (Coke); Joan O'Callaghan (Press and Information), and Mary Bishop (Central Services). There has been a keen demand for tickets, which are now almost sold out. At the time of writing a few seats at 2s. 6d. remained obtainable from the Hon. Secretary, Miss M. A. Warne, Coke Department, Gas Council, 1, Grosvenor Place, London, S.W.1.

Fire Service Statistics

A RETURN of Fire Statistics for 1950-51, has been published jointly by The Institute of Municipal Treasurers and Accountants and the Society of County Treasurers. This is the first joint return of fire services statistics to be published and relates to the services provided by all fire authorities in England and Wales.

In order to provide suitably comparable figures for all authorities, the analysis of expenditure and income, which forms the main basis of the Return, is expressed as a cost per 1,000 population. The total cost for each authority is also expressed as a cost per uniformed member of the brigade and there are also supporting statistics of fire stations, fire fighting appliances, and personnel.

There is a note on the complications arising from large pensions transactions which did not relate to the year 1950-51 alone. The effect of these complications is brought out clearly in the tables, but it is difficult to compare the figures with those of last year.

B.H.D. ENGINEERS, LTD.

At a Board meeting of B.H.D. Engineers, Ltd., on January 9, 1952, it was resolved to pay an interim dividend of 5%, less tax (same) on February 15 to all Ordinary shareholders on the register at January 31. Preference dividend of 3d. per share, less tax, is payable on April 1.

COMMERCIAL MANAGERS MEET AT MANCHESTER

THE Commercial Managers' Committee representing all 12 boards and the Gas Council met in Manchester on January 17. After the business meeting, members were entertained to luncheon by the North Western Gas Board whose Chairman, Mr. D. P. Welman, welcomed the Commercial Managers.

The following members of the Committee were present:—

Mr. S. G. Aberdein, Commercial Manager, North Thames Gas Board (Chairman); Mrs. Eileen Murphy, Gas Council (Secretary); Mr. R. J. Gregg, Publicity Manager, Gas Council; Mr. H. R. Hart, Commercial Manager, East Midlands Gas Board; Mr. S. A. King, Sales and Service Manager, Tottenham Division, Eastern Gas Board; Mr. N. Hudson, Chief Commercial Officer, North Eastern Gas Board; Mr. J. E. White, Divisional General Manager, Newcastle Division, Northern Gas Board; Mr. V. W. Stanton, Commercial Manager, South Eastern Gas Board; Mr. W. L. Wright, Commercial Manager, South Western Gas Board; Mr. W. K. Tate, Divisional General Manager, Eastern Division, Southern Gas Board; Mr. E. Ablett, Chairman, Swansea Group, Wales Gas Board; Mr. J. Tudor Rees, Sales and Service Manager, West Midlands Gas Board; Mr. R. H. Bone, Commercial and Sales Officer, Scottish Gas Board; Mr. J. W. Rodgers, Sales and Service Officer, North Western Gas Board; and Mr. J. O. Cooke, Manager, Coke Department, Gas Council (co-opted member).

DEVELOPMENTS IN OXIDE PURIFICATION PLANTS

By G. U. HOPTON, B.A., B.Sc., M.I.Chem.E., M.Inst.Gas E.,
Research Department, North Thames Gas Board.

In this paper to the London and Southern Section of the Institution of Gas Engineers the author explains the plans of the North Thames Gas Board to install mechanical purifiers as well as plants of the tower and the tower-box types.

THE size of the plant required for oxide purification depends partly on the activity of the material in use and partly on the load factors and operating conditions. With a highly active oxide it is possible to reduce considerably the volume of oxide in use, provided that a box can be rapidly emptied and filled and that long periods of overload are not experienced. In the absence of catch boxes the need for substantially clean gas at the inlet of the last taker so as to avoid difficulties when swinging increases the size of the plant.

The North Thames Gas Board has adopted as a general standard for coal gas a size of box equivalent to 0.52 sq. ft. of cross-section per 1,000 cu.ft. of gas a day with four boxes in the set. With a total depth of oxide in one box of 4 ft. this is equivalent to 20 cu.ft. of gas per hour per cu.ft. of oxide in one box. This figure is often referred to as the R ratio, but may conveniently be called the number of space volumes per hour. In the case of carburetted water gas the size of box is reduced to 0.4 sq. ft. per 1,000 cu.ft. of gas a day, which is equivalent to 26 space volumes per hour, but this reduction is made only when electrostatic precipitators precede the purifiers.

These dimensions are admittedly conservative, and some installations are operated in the industry at rates of 40 or more space volumes per hour per box. The reactions in oxide purification are not yet fully understood, and control of conditions is inadequate because of the simplicity of design of purifiers. As a general rule, therefore, the conservative design figure of 20 space volumes per hour for coal gas is considered to be justified on grounds of safety. Where mechanical handling of the oxide is used, reduction in size can be made, and this feature will be discussed later in the case of tower purifiers.

Normal Boxes

The first feature in the design of normal oxide boxes, by which is meant a box with a total depth of oxide of about 4 ft., is the material of construction. A careful comparison of designs has shown that the costs of welded mild steel boxes and reinforced concrete boxes are almost the same. Cast iron construction is appreciably dearer. Many installations of mild steel purifiers are in satisfactory condition after long service on coal gas and water gas. Test drillings in steel sideplates in contact with oxide since 1924 have shown only 5% wastage.

The next main feature is the position of the box relative to the ground, and facilities for charging. The cost for an installation of reinforced concrete boxes of capacity 7½ mill. cu.ft. of gas per day at 20 space volumes per hour is as follows:—

Three streams, each of four boxes, 36 ft. square by 6 ft. 6 in. deep.

Ground level boxes	£170,000
Elevated boxes	£200,000
Elevated boxes with overhead floor and roof	£240,000

These costs include foundations, oxide handling plant, iron work, connections, and valves.

The labour cost for emptying and filling a ground level box 30 ft. by 35 ft. by crane and skips and partly by shovel to and from rail wagons is £29. On account of the relative ease of discharging oxide through the doors of an elevated box, the corresponding labour cost for an elevated box is £22 when charging by wagon tippler and belt conveyor. The difference in cost is £7, and the figure for a 36 ft. square box may be estimated at £8.6. Allowing 35 changes a year in a 7½ mill. cu.ft. installation, the difference in labour costs is £300 a year. It is seen that on costs alone the elevated system is not justified. Similarly, the time lost due to heavy rain when emptying or filling is small in relation to the cost of the roof. For example, the average operating cost for oxide purification in the Gas Light district of the North Thames Gas Board was 0.173d. per therm for 12 months ended March, 1951, of which 0.029d. per therm was the cost of emptying and filling boxes. The cost of a roof for a 7½ mill. cu.ft. installation is £15,000, which at 7% per annum of 300 days is equivalent to 0.025d. per therm. Again, the provision of a top floor shortens the time taken to charge a box, but the saving in labour cost alone does not justify spending £25,000.

It is, however, fully realised that considerations of cost may not be so important as the labour requirement. The crux of the matter is whether sufficient men are willing to undertake unpleasant work. For this reason elevated boxes with top floor are generally preferred in the North Thames Gas Board, particularly where the site is restricted. Considerable attention is also being given to improving the method of emptying ground level boxes, including the use of portable belt conveyors extending over the side of the box, and the use of a crane for grabbing out the oxide after it has been roughly broken by pneumatic spades. This latter method has been found to reduce the labour requirement by one half.

So much has been said elsewhere about box design that only the briefest notes will be given here. The tendency to build large boxes has often been taken too far. The North Thames Gas Board considers that 36 ft. square (for a 2½ mill. stream) is a size that should not be exceeded. Problems of gas distribution and overheating become serious in larger boxes, and too much oxide is out of action when a box is changed. Gas flow is split between two layers of oxide each 2 ft. deep and it is preferred to use centre inlet. Centre inlet results in less chilling of the gas as it enters the box, while centre outlet ensures that the gas does not leave in contact with condensate which may throw off. Throwing-off should, however, not be serious if boxes are kept clean and ammonia slip is not above 10 grains per 100 cu.ft. The bottom grids become caked with centre outlet, which is a disadvantage. Some installations in the industry are equipped for reversal of gas flow in any box independently, and the practice is found to lead to higher fouling of the oxide, so that new material can be worked up to fully spent in two exposures instead of three. The extra complication and expense of the valves (seven per box instead of three) may thus be justified. There is also an important advantage in better control of the moisture content of the oxide bed.

In filling boxes particular care should be taken to charge the bed uniformly with material free from fine dust and of suitable moisture content. Very wet oxide is useless since the activity of even the best material is lost when excessive moisture is present, as tests in the laboratory will readily show. Dry oxide is so dusty that high pressure loss and channelling are very liable to occur, particularly if disintegrators are used to crush part-spent oxide. Unfortunately, the mixing of wet new bog ore with dry part-spent oxide is unsuccessful unless the part-spent oxide has a high activity, since it alone must

do the work until the heat of the reaction has dried out the bog ore. The maintenance of activity in part-spent oxide requires the utmost vigilance, and overheating in the box (due to excessive use of indirect heaters, very high hydrogen sulphide content in the gas, too much air, or infrequent swinging) or on the ground (due to leaving discharged material uncrushed in heaps) must be avoided. Much study is being given to the use of steam injection and second-box air admission, and to methods of revivification on the ground by breaking-down and moving immediately after discharge, followed by crushing, spreading out, and moistening. This work has been described by P. F. F. Clephane ('Available Iron in Part Spent Oxide,' London and Southern Junior Gas Association, November 2, 1951).

Deep Boxes

The cost of deep boxes—that is, boxes with double the normal depth of oxide—is less than that of normal boxes of equal capacity. In fact the construction of deep boxes is so much cheaper that five boxes may be provided instead of four to allow for the longer time required to empty and fill a deep box. It is considered that two sets of five boxes each 30 ft. square by 12 ft. deep, containing two layers of oxide each 4 ft. deep, and thus rated at 21.7 space volumes per hour per box, would be suitable for a 7½ mill. coal gas stream, and that the cost in welded mild steel would be £160,000 for ground level boxes. This price includes mild steel sides bolted down on a concrete bottom slab, mild steel covers, gas connections and valves, and overhead crane for grabbing oxide out of the box, and it compares favourably with the prices for normal boxes quoted previously.

Working conditions for discharging deep boxes are poorer than in normal boxes and it is desirable to purge a deep box before opening it. Deep boxes are particularly suitable for water gas where box discharging is relatively infrequent. In an installation for 4½ mill. cu.ft. of C.W.G. per day, consisting of one set of five ground-level boxes 30 ft. square by 12 ft. deep, it is intended to provide two layers of oxide each 4 ft. deep in split flow. The rating will therefore be 26 space volumes per hour per box. Large steel grids, 10 ft. by 5 ft., will be lifted by the crane, and the oxide will be taken out by a 1-ton grab after breaking with pick or pneumatic tool. The columns supporting the grids will have spigot joint connections so that they can be lifted out readily.

It is obvious that a considerable saving in cost over normal boxes would be achieved if the number of deep boxes were reduced from five to four in the installations described. If experience of discharging by grab proves to be satisfactory, then future installations in the North Thames Gas Board may be provided with no more oxide than in normal sets. Meanwhile the installation of deep boxes has the advantage over normal ground-level boxes of occupying less ground space, and permitting the gas connections to be arranged along the sides of the boxes without the need for trenches.

Tower Purifiers and Tower Boxes

In normal boxes and deep boxes the labour requirement for emptying and filling is high, and the work of emptying is arduous and unpleasant. The provision of trays which act as containers for the oxide and which can be lifted by crane is a very great improvement.

Before describing tower purifiers and tower box purifiers, which make use of trays, reference should be made to the tray purifiers installed at York, which were visited by courtesy of the North Eastern Gas Board. These consist of four boxes each 28 ft. 6 in. square by 9 ft. high containing eight trays 13 ft. square arranged in two tiers. Each tray holds two layers of oxide 16 to 18 in. deep. The gas flows through the 16 layers of oxide in a box in parallel. At a rating of 4 mill. cu.ft. of C.W.G. per day the plant is designed for 45 space volumes per hour per box. The boxes are arranged in line, and the 22-ton crane for lifting the trays (and the covers) runs over the boxes with an extension over sufficient ground to accommodate eight trays of spent oxide and eight trays ready charged with new or revivified oxide. The trays of spent oxide are discharged by hand.

The first Thyssen-Lenze tower purifiers in Great Britain were installed at Wandsworth by W. C. Holmes & Co., Ltd., and the plant has been described by C. M. Croft (Institution of Gas Engineers Communication No. 212, 1939). The North Thames Gas Board has now placed an order for an installation of tower purifiers with mechanical tipping for 7½ mill. cu.ft. of coal gas a day. This installation will consist of six working towers, each containing 13 trays 17 ft. in diameter, each tray holding a layer of oxide 33 in. deep. The rating over the whole installation is 6.25 space volumes per hour, as compared with five over the four boxes of the Board's standard design of normal boxes. The plant includes also a stocking tower in which trays of spent oxide are kept in an inert atmosphere until it is convenient to empty them, and a stocking frame which holds trays filled with fresh oxide ready for charging. When a tower is taken off the line, five towers carry out the purification while the trays of spent oxide are lifted into the stocking tower, and trays from the stocking frame are loaded, the whole operation being completed within one working day.

An order has also been placed by the North Thames Gas Board for tower box purifiers for 7½ mill. cu.ft. of coal gas per day. This installation comprises six rectangular towers built in line with common walls, five being working towers and one a stocking tower. The stocking tower is, however, fully connected so that it can be used as a sixth working tower for peak loads except when a tower has to be changed. In fact it would be better to speak of an installation of six working towers of which one is normally out for changing. A stocking frame is also provided for trays containing fresh oxide. Each tower has a cross-section of 28 ft. 9 in. by 16 ft. 1½ in. and contains 14 trays 26 ft. by 13 ft. holding one layer of oxide 27 in. deep. The rating over five towers is 6.1 space volumes per hour, so that slightly more oxide is available than in the tower purifier installation. When all six towers are in use the rating is 5.1 space volumes per hour, which means that very nearly as much oxide is present as in the standard purifier design described previously. The costs of tower purifiers and tower boxes for 7½ mill. cu.ft. of coal gas a day lie between those of conventional elevated boxes and conventional elevated boxes with top floor and roof. Tower boxes are somewhat cheaper than tower purifiers owing to the simpler construction.

The tower purifiers and tower box installations are provided with mechanical tippers. It is proposed to clamp the trays of spent oxide in a frame and rotate them through 180° over a hopper feeding an oxide crusher, any severely caked oxide being first loosened by pneumatic tools. Each tray contains only one layer of oxide, and gas flows in parallel through the layers in a tower. The grids will be kept in place during tipping.

A main feature of difference is that the tower purifiers are provided with dry seals in the form of rubber rings between the central gas ducts, whereas the tower box purifiers are equipped with Lecocq hydraulic seals, with sealing water flowing in cascade from the top to the bottom of the tower.

The advantages of being able to load trays with prepared oxide on the ground and storing them ready for use in the stocking frame, and of lifting the trays of spent oxide from a tower and emptying them by tipping, are great. It is realised that the system of emptying by tipping has not yet been put into practice, but sufficient confidence is felt in the feasibility of the scheme to order not only the two installations each for 7½ mil. cu.ft. described, but also an installation of tower boxes for 4 mill. cu.ft. of coal gas on another works of the North Thames Gas Board.

It is estimated that the total labour costs including oxide preparation will amount to £400 per annum for tower boxes for a 7½ mill. installation, as compared with £1,550 for conventional elevated boxes. The saving is £1,050, per annum equivalent to a capital cost of £16,500 at 7%. This saving is

(*Continued on p. 297*)

more than the extra cost of tower boxes compared with conventional elevated boxes without top floor or roof. The saving will be cheaper in total costs for small streams, but the advantages of reduced ground space and elimination of arduous manual labour make the adoption of tower purifiers and tower box purifiers with mechanical tipping highly desirable.

Processes Using Special Oxide

In the plant described above, the oxide is in the familiar form of a mixture of iron oxide and fibrous matter of particle size ranging from less than 1/40 in. to more than ¼ in. It may be of natural origin such as Dutch bog ore, or artificially prepared from precipitated oxide and wood or peat. Generally works with easy access to the east coast use bog ore, whereas inland works, and those on the west side of the country, use artificial oxide.

Unpromising as the physical state of this material is, many attempts have been made to use oxide in plant other than boxes or trays. For example, Beuthner described in 1931 a system using ground oxide passed countercurrent to gas in a tower and re-circulated (British Patent No. 369,490). None of these schemes has survived.

At the Bournemouth meeting of the Institution of Gas Engineers in 1950 a pilot plant for the treatment of carburetted water gas in a cylindrical vessel by means of artificial oxide in continuous downward passage countercurrent to the gas flow was shown. The oxide was supported on a horizontal rocking-bar grate, and after passage through the grate the oxide was discharged through a rotary valve into a Redler conveyor within which it was revivified during its return to the top of the vessel. Details of the progress of this design are awaited with interest.

Other designs of special apparatus may be considered if shaped oxide bodies are used. The North Thames Gas Board has been interested for some years in the use of granular material based on α—$Fe_2O_3.H_2O$, the most active of the seven forms of ferric oxide. The first material studied was nodules of diameter $\frac{3}{16}$ in. to $\frac{3}{8}$ in. made by rolling a mixture of finely ground ferrous sulphate (copperas) and calcium hydroxide (slaked lime) while sprinkling with water, followed by screening and allowing to oxidise in air. These nodules are porous and fairly strong, but they contain a rather high proportion of calcium sulphate. Granular material consisting of α—$Fe_2O_3.H_2O$ entirely was then made by feeding precipitated oxide to a tabletting machine. The tablets of $\frac{1}{8}$ in. diameter are extremely active but somewhat costly to make. Recently a very promising form of granular α—$Fe_2O_3.H_2O$ has been made by treating copperas in solution with concentrated ammoniacal liquor, filtering off the precipitate, drying it, when oxidation also occurs, and breaking the cake into suitably-sized pieces. This broken press-cake has both a high activity and a high capacity for hydrogen sulphide.

Two types of plant particularly suitable for nodules or broken press-cake, while also capable of dealing with screened ordinary oxide, are being studied. The first depends on the passage of the material downwards through a tower provided with special automatically-operated valves, while the second is based on downward flow of gas in series through a horizontal vessel fitted with baffles which permit the changing of the oxide in any one compartment without distributing the rest.

Mechanical Purifiers

The mechanical purifiers now on order consist of two vessels each rated at ½ mill. cu.ft. of carburetted water gas a day. Each vessel will have a working volume of oxide of 210 cu.ft. equivalent to 100 space volumes per hour (Fig. 1). The oxide contained in a storage hopper above the vessel will be admitted into a top measuring hopper of 13½ cu.ft. oxide capacity by means of a specially designed measuring valve operated by a B.T.H. thruster. This measuring valve on opening will allow the oxide to run by gravity into the top measuring hopper until it is full, and will then close gas-tight without crushing or trapping any oxide against the seating, despite the fact that oxide will still be heaped above the valve. At the foot of the purifier vessel there will be provided a bottom measuring hopper also of 13½ cu.ft. oxide capacity, with a measuring valve between the purifier and the hopper. When this measuring valve is opened, oxide will run by gravity from the purifier into the bottom measuring hopper, and the valve will then be shut. At the same time that this operation occurs, a cone valve at the foot of the top measuring hopper will

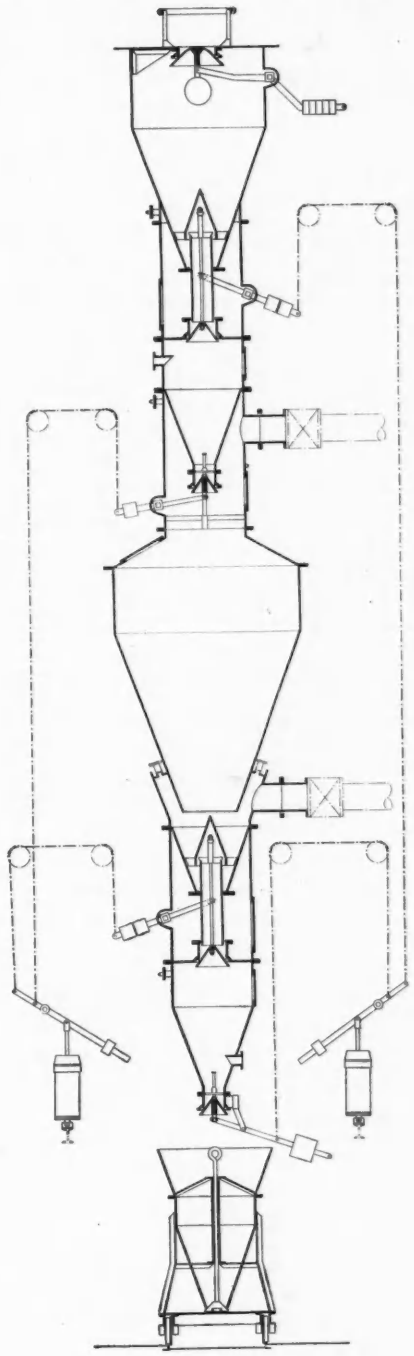


Fig. 1.—Mechanical Purifier.

be opened so that fresh oxide is added to the purifier vessel as spent oxide is removed. The bottom measuring hopper will be purged into the purifier vessel by inert gas before the bottom discharge valve is opened, and the spent oxide dropped into a lifting bucket. Similarly the top measuring hopper will be purged before oxide is added from the storage hopper. These purging operations will be performed by valves whose action is linked to that of the main valves.

The spent oxide in the lifting bucket will be transported to a rectifier of capacity 840 cu.ft. or twice that of both the purifier vessels. In this vessel it will be revivified by blowing air upwards through the vessel. Water sprays will be provided above the surface of the oxide. The revivified oxide will be discharged into the lifting bucket and transported to the storage hopper above the purifiers.

Provision will be made for bleeding off spent oxide and adding new oxide to the system as required. The installation will be used to study the effect of the activity and capacity of the oxide on the throughput rate, and the time required for complete revivification under various conditions, a matter about which too little is known.

Tests on the special measuring valve have shown that it is satisfactory not only on granular material, but also on ordinary oxide mixtures provided that dust below $\frac{1}{32}$ in. is screened out. The installation will therefore include a vibrating screen. Moisture content must be kept within limits, but this control should be simple in a circulating system.

The horizontal purifier is at present being tested on a small scale on coal gas at one of the works of the North Thames Gas Board. It consists of a vessel whose section (like that of the mechanical purifier) is shaped with reference to the angle of repose and the angle of discharge of oxide, so that uniform packing and even flow of material through the vessel are achieved. The vessel is divided into six compartments side by side with downward flow of gas in each, the gas being led upwards in narrow channels between the oxide beds. Solid vertical baffles are fitted between the compartments with perforations near the base for passage of gas from the oxide bed, these perforations being smaller than the oxide particles. Tests are made of the hydrogen sulphide content of the gas in each gas channel, and the oxide in any one compartment is changed without disturbing the rest when the efficiency of that compartment becomes unduly low. Experiments are being carried out at the rate of 400 cu.ft. of gas per hour with 4 cu.ft. total volume of oxide. It is too early to say how this scheme compares with countercurrent movement of oxide in a vertical tower.

DISCUSSION

Mr. J. E. Davis (South Eastern) said that the London and Southern Section had good reason to be grateful to Mr. Hopton and to the North Thames Board for putting before it so frankly their present thoughts on the design of oxide purification plants. One might have thought that a process so apparently simple and so well established would not call for much ingenuity in design; yet they knew from the work of the Gas Research Board that the chemistry and physical chemistry of the process was still far from completely understood, and it was equally clear from this paper and from others like it that design data for the plant had yet to be checked and confirmed.

He thought it might be helpful to discussion of this matter if they considered broadly the basic economics of oxide purification, dividing the total costs between capital costs, materials cost, and operating costs. If they took a long view over the year, they could rule out the materials cost because, by and large, the revenue from spent oxide had paid for the new purifying material. In the years immediately following the last war it did not quite do so, and at the moment it was rather more than doing so, but over a longish period this statement was roughly true.

If they took Mr. Hopton's figure for the cost of ground level boxes they found that the capital charges for this plant amounted to about ¼d. a therm; so also did the operating costs. Clearly they could not afford any mechanical handling device or other labour-saving construction which would materially increase the capital cost. If they doubled the capital cost they must eliminate operating costs entirely in order to break even, and even a 50% increase in capital cost would, for the same economic result, require half the operating costs.

The problem was essentially no different today from when Mr. Davis studied it in detail some 20 years ago in connection with the installing of No. 6 stream purifiers at East Greenwich works. They then came to the conclusion that they could not afford any mechanical handling device or any form of construction to make the handling of oxide easier unless that device was a simple and cheap one and could be used on all boxes of the stream. The reason for this was obvious when one realised that each purifier was re-charged perhaps once in three months, and the provision of expensive gear for facilitating this work might easily represent a large amount of idle capital.

Labour Costs

Mr. Hopton showed that by elevating the boxes it was possible to make a reduction of about 25% in the labour costs for discharging a purifier. In an investigation made some few years ago of the manual operations involved in changing a purifier it was found that the longest and most difficult labour effort was in loosening the oxide and throwing it towards the point of discharge, which might be a bottom opening to the box, or a barrow or a skip or a basket. There seemed to be many ways of dealing with the oxide once it was on the move. The real difficulty lay in getting it on the move. Perhaps this was why the designs of tower purifiers and tray purifiers had evolved, enabling this most difficult part of the operation to be undertaken at leisure.

If it was going to be difficult to afford mechanical devices because of the small added capital charge permissible, perhaps they might be able to reduce the incidence of the capital charge by increasing the gas loading per unit of capital investment. Indeed, Mr. Davis seemed to detect such a tendency in the figure of 100 space volumes for the mechanical purifier and the horizontal purifier referred to in the paper.

He hoped they could continue to call this figure the 'R' ratio, not because using it was a particularly good term, but because they had all become used to it.

During the last two years they had made a survey of oxide purification practices in the larger works of the South Eastern Gas Board, and it was not unfair to say that they had found almost as many different practices as works visited, with 'R' ratios ranging from 20-70. What was the factor which set a limit to the 'R' ratio? Mr. Davis was coming to the conclusion that it was the apprehension of the engineer that when he had to change a purifier, the remaining boxes in the stream would not hold back the hydrogen sulphide. This might give them new thoughts on catch purifiers, because if they could double the capacity of a four-box stream by adding one catch purifier, the net gain was three boxes. Then they might be able to afford some mechanisation, and if they did that they might be able to change the oxide in the one box in a very few hours. Mr. Davis believed that the ability to change a charge of oxide quickly and have the box back on the stream again quickly, could enable substantially heavier loadings and a decrease in capital cost per therm of gas treated. He would suggest, too, that if they did in such a manner provide a margin in the capital cost whereby they might purchase mechanical handling plant, he would like to think that the mechanical plant was, as far as possible, of the multi-purpose type so that it could be used for every day of the year—on a large works perhaps wholly on oxide handling, but on a smaller works handling other material as well.

The Safety Margin

Mr. A. H. Savill (South Eastern) said he had been concerned with systems of purifiers comprising two, three, four, five and six boxes in each stream, and he was interested to note that the North Thames Gas Board was installing streams consisting of four boxes, where purifiers of normal depth were employed. He suggested, however, that at any rate in small works where the sole purifying plant consisted of one stream, it was desirable for this stream to consist of not less than five purifiers, since the increased number of boxes would have the ability to deal with more than 25% more gas, a smaller proportion of the stream would be out of action when a box was being discharged and there would be a greater margin of safety, particularly when changing the box order. It was believed that the arguments in favour of five and six box streams also applied to larger works where the purification

plant comprised a number of streams, although in these cases it was usually possible to reduce the load on the weak stream for a sufficiently long period to enable the third box outlet to clean up before changing the order.

While there was no doubt that purifiers could be operated with a higher 'R' ratio than that quoted by Mr. Hopton as North Thames practice, Mr. Savill entirely agreed with him that an 'R' ratio of 20 did give that margin of safety which made all the difference between peace of mind and sleepless nights when dealing with winter loads.

In his comments concerning centre inlets and outlets for split flow boxes the author mentioned the fact that with centre gas outlets the oxide on the bottom grids became caked. In Mr. Savill's experience the layers of oxide always tended to cake on the upward working grids, and this condition would prevail on one or other of the tiers whether the boxes were equipped for centre inlet gas flow or centre outlet gas flow. With regard to flow reversal in the individual boxes, in his experience it had been most difficult to be sure that there was any great advantage in this method of operation. The first set of tower purifiers at Wandsworth was equipped for flow reversal, but in view of the experience gained over a number of years, it was decided to install the second set for one way operation only.

Mr. Hopton's comments regarding the disintegration of partly spent oxide were of the utmost importance, and it would be very helpful if he would give more information with regard to the extent to which disintegration could be practiced without the production of an oxide which was so finely divided that it resulted in an undue pressure loss. Further information on the subject of the quantity of air which could be added and the best position for its addition would also be of great assistance.

Tower Box Purifiers

With regard to the tower box purifiers, it was important to remember that whereas the area of the purifier itself was 810 sq. ft., the area of the trays was only 676 sq. ft.—so that there was a wasted area of more than 15% which might be an important factor where site space was restricted. In other respects it seemed that the tower box purifier combined a number of the advantages of towers and box purifiers.

The Wandsworth tower purifiers, which were installed some 12 years ago, had operated satisfactorily throughout that period, and the second installation, which was put to work a little over two years ago, differed from the first only in the fact that reversal of gas flow for individual towers had been discarded. Both installations comprised six towers and the full-load rating was 6½ cu.ft. of oxide per 1,000 cu.ft. of gas purified per day, which amounted to 6.4 space volumes per hour as compared with 6.25 space volumes quoted by Mr. Hopton for the proposed installation in the North Thames area. The proposal to use mechanical tippers for emptying the oxide containers was one which they would view with considerable interest because they had always considered that the greatest difficulty in connection with emptying the container or the box arose from the process of breaking and not from the actual removal of oxide.

The comparatively recent practice of charging the purifiers with oxide in containers, said Mr. Savill, represented perhaps the greatest advance made in oxide purification since its inception, and they looked forward with interest to the publication of further information concerning the operation of the various systems of tower box purifiers. Mr. Hopton had listed a number of processes employing special oxides and in most cases continuous in operation. There was no doubt that any successful continuous purification system whether it employed dry oxide or came under the heading of liquid purification would completely revolutionise purification plants in the carbonising industries, but any such process must not only be continuous but must also provide that margin of safety which was so essential to the normal operation of the works.

Mr. J. T. Haynes (Southern) observed that there were one or two discrepancies in the paper. For instance, Mr. Hopton set out with a space volume range of 20-26 in the case of static purifier boxes of the ordinary and tray type respectively; but when he came to deep boxes the figure was 21.7 and with tower purifiers 6.25 or 6.1. What was the explanation of this apparently retrograde step in the capacity of purifiers? Sufficient notice had not been taken of Dr. Moignard's paper to the Institution of Gas Engineers, which demonstrated that by simple control the 'R' ratio could be raised to something like 45; in other words, the capacity could be increased by from 50 to 75%. Another important point was the nuisance which purifiers in built-up areas could cause by the smell of the spent oxide. This factor was recognised in the Poole installation, where the plant had been put inside brick buildings with suitable extractor fans discharging into a tall chimney. Mr. Haynes suggested that the industry might well have to consider some such means generally in the future. Mr. Hopton touched a very sore point in his reference to the removal of dust since a large proportion of this dust was purifying material. The savings which could be effected by reducing labour were, in effect, funds available for capital expenditure, but when there was no labour available they would have to find funds for capital expenditure on mechanisation.

Mr. W. F. Thorne (Southern) endorsed Mr. Haynes reference to the work of the Gas Research Board, of which there was no mention in Mr. Hopton's paper.

Dr. J. Burns (North Thames) said that the design of oxide purifiers was to a great extent determined by the labour position—in fact, by the shortage of labour. Purifiers were installed with an expectation of life of about 33 years, and they could not afford to make any mistakes or alter the design on a basis of whim or fancy. At the same time, this did hold up development. It was surprising how little they knew about the oxide reaction. The fundamental work which had been done was very useful in this respect, and when they knew more about the oxide reaction they would be able to judge better what type of boxes to build. Dr. Burns thought the gas industry would tend to develop in large units, and it might pay them in the future to link together several 7½ mill. units, and then they might install wet purification plant and associate purification with the production of sulphuric acid. In the meantime they had a lot to learn about the dry purification reaction.

Dr. H. Hollings (North Thames) mentioned their indebtedness to Mr. Hopton when they were studying some of the experimental work at Poole, when the author had given freely of his time and experience for the benefit of the Gas Research Board.

Mr. K. W. Francombe (Whessoe, Ltd., Darlington) said there could be few gas undertakings in the world with the vast experience of purification amassed by the former Gas Light and Coke Company and now bequeathed to the North Thames Gas Board. Through the good offices of Mr. Hopton this experience was now made freely available to all gas engineers in a paper which followed in the classic tradition of the previous communications by Avery and Cooper, not to mention the earlier contributions by Mr. Hopton and his colleagues. Mr. Francombe particularly commended the evaluation of the labour savings which might be obtained by mechanisation, elevated boxes, tower purifiers, etc., in terms of capital values, which were then contrasted with the additional capital costs of such special features. It was obviously of great importance that technical advances should always be assessed in terms of their economic value, although this was not always done so thoroughly. It was interesting to learn that reinforced concrete boxes and welded mild steel boxes cost about the same, and further details of the steel purifiers which had been in operation since 1924, with only a 5% wastage of the side plates, would be welcome.

A number of cost comparisons, which were of great value, were made on the basis of the purification of 7½ mill. cu.ft. per day in reinforced concrete boxes. As Mr. Hopton stated that the cost of welded steel boxes would be similar to that of concrete, Mr. Francombe was aghast at the extremely high capital costs quoted, even bearing in mind the conservative space velocities employed. The main reason for these high costs would appear to lie in the fact that the largest size box he would consider employing was 36 ft. square. This criterion resulted in the employment of three parallel streams, each of 2½ mill. cu.ft. per day capacity and each comprising four 36 ft. square boxes in series, for the treatment of 7½ mill. cu.ft. per day. While sound reasons were given for imposing this size limitation, he would have thought that the financial implications would have been so serious as to warrant consideration of the employment of larger boxes such as might be seen at undertakings throughout the country, and of considering means whereby the disadvantages of such larger boxes might be overcome.

Admittedly with space velocities of 20 and a total oxide depth of 4 ft., it would be difficult to provide a single set of four boxes for this duty, since each box would have an area of about 3,900 sq. ft., or, say, 45 ft. × 87 ft., which would probably be considered prohibitive. However, if Mr.

Hopton's deep box recommendations were studied, it would be seen that in certain circumstances he was prepared to accept two parallel streams each of 3¼ mill. cu.ft. per day capacity and each comprising five 30 ft. square boxes in series, for the treatment of 7½ mill. cu.ft. per day. The cost would be £160,000, and £10,000 would be saved on the example previously quoted. Now if he would consider using a single set of five deep boxes, each box, say, 60 ft. × 30 ft. or 51 ft. 6 in. × 35 ft., again containing 8 ft. of oxide, he would find the cost of such an installation of mild steel elevated boxes, without overhead floor and roof, would be of the order of £120,000. (Time had not permitted an accurate estimate, nor did he know the exact estimating basis of Mr. Hopton's example of shallow boxes costing £200,000, or deep boxes costing between £180,000 and £190,000).

The potential saving was so vast as to warrant investigation into the means of overcoming the inherent defects of large boxes—viz., poor gas distribution, overheating, and lost capacity when changing a box. It would be expected that distribution could be improved by suitably designed internal ducts; overheating by carefully controlled operation; and lost capacity was already partly taken care of by Mr. Hopton's provision of five boxes instead of four. If up to £80,000 could be saved it might be thought worthwhile to put up with certain disadvantages, particularly when Mr. Hopton was at such pains to consider whether a roof was worth £15,000 and a top floor £25,000, advantageous though such refinements may be. If Mr. Francombe's rough price of £120,000 for a 7½ mill. 5 box set was anywhere near correct, this would have a profound influence on the comparison Mr. Hopton drew between orthodox boxes and tower purifiers. They might infer that tower purifiers were estimated to cost about £220,000 and tower boxes, say, £210,000. It would appear that this was a heavy price to pay for the elimination of arduous manual labour.

Construction Costs

Mr. W. T. J. Gedge (Eastern) observed that Mr. Hopton gave the cost of installing reinforced concrete boxes of normal design having a capacity of 7½ mill. cu.ft. per day and, later, compared capital and operating costs of this type of purifier with tower purifiers of the same capacity. The cost of installing three streams of elevated boxes without roof covering, each stream consisting of four boxes 36 ft. by 36 ft. by 6 ft. 6 in. deep, was given as £200,000, the total box area being 15,520 sq. ft. During 1948 an installation of reinforced concrete purifiers was built for the new works at Ponders End. This installation was for 8 mill. cu.ft. per day and consisted of four streams of elevated boxes, each stream of five boxes 30 ft. by 30 ft. by 7 ft. deep and was complete with oxide handling plant, oxide shed and Connersville meters to each stream. The total box area was 18,000 sq. ft. The total cost of the complete installation was £111,069. At the present time a somewhat similar installation was under construction at Willoughby Lane works.

For dealing with 8 mill. cu.ft. of coal gas per day there would be four streams of five boxes 30 ft. by 30 ft. by 7 ft. deep. The estimated cost was £146,000, representing an increase of 30% over the 1948 figures. In addition, an installation of boxes for dealing with 10 mill. cu.ft. of C.W.G. per day was nearly completed. This installation consisted of four streams each of four boxes 30 ft. by 30 ft. by 7 ft. deep the cost of which should not exceed £118,000. Both Ponders End and Willoughby Lane installations had a travelling gantry bridge for filling the boxes with oxide and for cover lifting, and in the case of Willoughby Lane the gantry bridge had a roof covering of sufficient dimensions to give weather protection to operators emptying or filling a box.

A possible reason for the higher costs of constructing reinforced concrete purifiers in the North Thames area was the type of construction. Mr. Gedge noticed from the illustrations that the walls of the boxes and the columns were ornamental. This ornamentation had no significance as regards structural strength and was costly.

The annual operating costs for purification at Ponders End was 0.17d. per therm—practically the same as the average cost in the Gas Light area of the North Thames Board. The labour cost of £400 per annum for tower purifiers seemed very low. No mention was made of the higher electrical power rating, and no allowance was made for the higher maintenance charges. The electrical load would be a peak on the maximum demand rate. When the Willoughby Lane installation was in the project stage the question of tower purifiers was considered, and it was estimated from the information obtained of the experience at Wandsworth that the annual operating costs for towers would be 0.167d. per therm for one fouling per year and 0.197d. per therm for two foulings.

They changed oxide in boxes to obtain a sulphur content of 45%-50%, it was not believed that this sulphur percentage could be obtained by one fouling per year with towers. It seemed, therefore, that the operating costs for towers would be at least equal to that of normal boxes. Mr. Gedge was puzzled at the apparent tendency to change from reinforced concrete to steel for purifier construction at a time when there was a shortage of steel. Maintenance charges would be lower for good designed concrete, and there was the advantage that concrete boxes were not so much affected by changes in atmospheric temperature. His experience was that when concrete boxes were constructed there was delay in placing them into commission by reason of the delay in receiving the structural steel needed for the installation.

Relative Economics

Mr. J. T. Veryard (South Eastern), after first congratulating Mr. Hopton on his concise presentation of the essential details of the various types of modern oxide purifiers, suggested it would have been helpful if the relative costs of the various types of plant—say, for a 7½ mill. per day—could have been given when providing the same ratio of purifying material to gas throughput. Costs were given for the various types of plant, but he noticed that, while the North Thames standard was a total of 8 cu.ft. of oxide per 1,000 cu.ft. of coal gas per day and 6 cu.ft. for C.W.G., the deep boxes provided 10 cu.ft. for coal gas and 8 cu.ft. for C.W.G., the tray purifiers at York 4 cu.ft. for C.W.G., tower purifiers 6.6 cu.ft. for coal gas and the tower box purifiers, 6.8 cu.ft. for coal gas if five were operated and 8.2 cu.ft. if six were operated. Summarising, there was a variation of 6.6 to 10 cu.ft. for coal gas and 4 to 8 cu.ft. for C.W.G., which must have an appreciable effect on the relative capital costs of the plants.

With regard to the North Thames standards for sizes, Mr. Veryard noted that the figure of 0.52 sq. ft. given for the cross sectional area per 1,000 cu.ft. per day was the same as that given by Alwyne Meade 30 years ago. Bearing in mind that today electrostatic tar precipitators and sometimes naphthalene washers were installed before the purifiers, it would seem that purifiers should be capable of being worked at higher gas velocities. A total volume of 8 cu.ft. in four boxes also appeared to be very generous. There were many works where, even when the capacity of the catch boxes was included, the total volume was less than 6 cu.ft., and he knew of one works of approximately 15 mill. per day having no catch boxes where the total volume of oxide per 1,000 cu.ft. per day was just over 3½ cu.ft., the 'R' ratio being 70. At fairly large works, even without mechanical handling, the purifiers should be capable of being operated at least at an 'R' ratio of 30 with four boxes and one catch per stream; at maximum loading a figure of 40 should be attainable.

At small works with only one stream of boxes many factors, other than the volume of oxide, had to be taken into account in assessing the purifying capacity. The presence in the gas of tar fog and oil vapours, the ability or otherwise to rotate the boxes, the number of boxes, the existence of a catch box and the time taken to change the purifying material were all items which had to be considered. The provision of too high a purifying capacity could have disadvantages. Temperatures might become too low in cold weather, and low gas loading per box, while giving a good margin of safety, resulted in the material staying in too long and becoming hard.

As regards mechanical handling he supposed they could regard the wheelbarrow as a form which had been with us for a long time. For the moderate size works there was no doubt that the mechanical shovel which could also be used for coal and coke handling was a good investment, and only for very large works could the types of mechanical handling mentioned in the paper be an economic proposition.

With regard to design, Mr. Veryard was not sure that split flow was at all desirable. The main advantage was that compared with the normal box with two or more layers in series, the back pressure should be approximately quartered, due, in effect, to providing double the cross sectional area and half the depth. If, however, from the point of view of gas distribution large boxes were to be avoided, and it was assumed that this meant boxes of large cross sectional area,

(*Continued on p. 304*)

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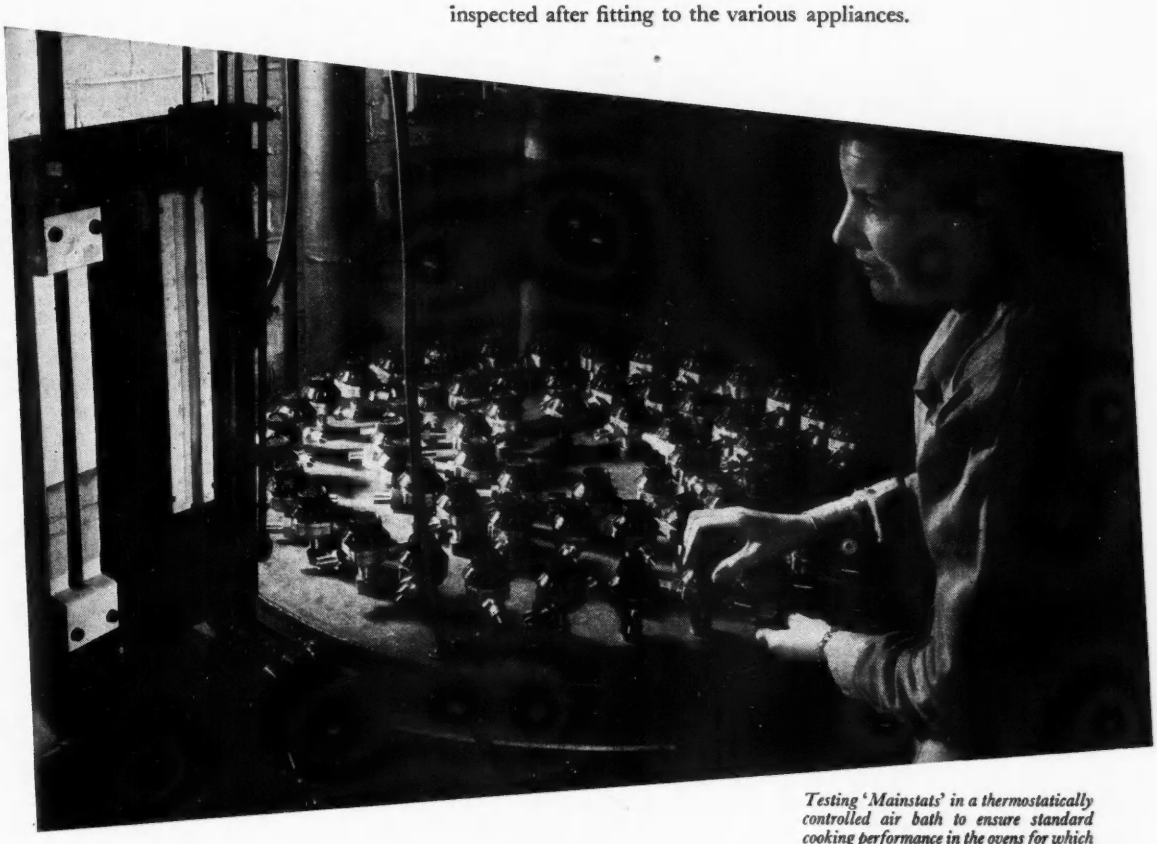

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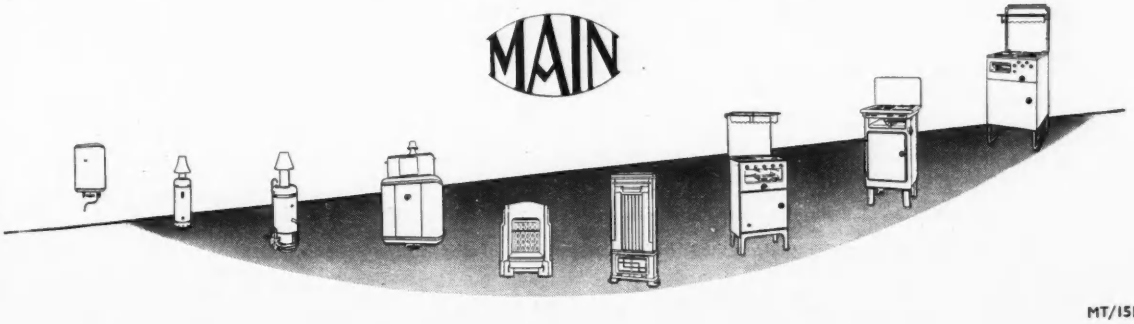

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then split boxes were to be avoided in that not only was the cross sectional area doubled, but it was extremely likely that the resistance of the oxide in the two layers would become different due to the difference in the direction of fouling. Personally, he thought it was best to have downward flow in primary boxes and upward in catches.

The use of disintegrators should be confined to the large material removed by screening; in this way, the proportion of fines was kept to a minimum. In describing tower purifiers and tower box purifiers, the author stated that each tray contained only one layer. He presumed this did not refer to tower purifiers which, up to the present, had contained two layers per tray. He noted that in having one layer only per tray in the tower box purifiers, split flow was avoided.

The use of water seals in these tower box purifiers was, he felt, a retrograde step. Most of them had been pleased to see the end of water seals on purifiers with their attendant disadvantages, and he would be interested to know the reason for the return to this type of seal. There were many interesting items in connection with the mechanical purifiers, and the arrangement of valves was very ingenious. He would be interested to know, however, how much dilution of the gas occurred by the purging gas used to prevent the loss of gas from the measuring hoppers.

Author's Reply

Mr. Hopton, replying to the discussion, agreed that the extra capital charges on more highly mechanised plant must be set against the reduction in labour charges, as had in fact been done in the paper. It appeared that tower box purifiers and tower purifiers could be justified on this ground alone for installations of fairly large size, not much below 10 mill. cu.ft. of gas a day. But this criterion was not the only one, and Dr. Burns had pointed out that shortage of labour determined to a great extent the choice of design of purifier.

Savings could obviously be made by working at a higher gas loading, and Mr. Davis said that reduction in the size of box for a given duty might be limited by apprehension that difficulties might be experienced when a box was out for changing. The deep box installation proposed for carburetted water gas was so valved as to permit rotation of the remaining boxes when any one box was out for changing. The set also contained five boxes instead of four, so that its behaviour during lengthy periods of high loading would be of interest in connection with Mr. Savill's suggestion for installing more than four boxes in a stream.

There were factors other than box changing and duration of peak loads in the choice of size of purifiers. The most important one was the severity of the legal test for hydrogen sulphide in gas, which led to demands for high safety margins in design. There was also the fear that some accident or hitch might delay the re-charging of a box, however well designed for rapid emptying and filling. Again, they could not be sure that the oxide in use would always be in good condition.

Much could be done to maintain activity of oxide, but the more experience one had of oxide purification, the less dogmatic one became about effective control. What control was possible over excessive temperature rise due to high hydrogen sulphide content, or excessive temperature drop due to low hydrogen sulphide content and bitterly cold weather, apart from measures such as second-box air admission, water sprays, gas heaters, steam admission and removable lagging, all of which had been used for years but which could not be claimed to be adequate in all circumstances ?

The main factor in the choice between centre inlet and centre outlet in split flow was labour. It was suggested that unless it was the custom always to take up the lower grids, then centre inlet was preferable, because the caked grids were the upper layer which must necessarily be moved on emptying the box. If the lower grids were not cleaned, then with centre outlet they would become sufficiently caked to effect the dividing of the gas flow between the two beds of oxide.

Mr. Savill's question regarding the preferred size of crushed oxide could be answered only in a general way. Work had been done in this country and in Australia on the pressure loss in relation to particle size, and it seemed clear that fine material below $\frac{1}{32}$ in. gave rise to unduly high resistance to gas flow. On the other hand, laboratory experiments showed that the finer material was the more active, as was to be expected. It was therefore suggested that crushed oxide should contain as high a proportion as possible—namely, 80% or more—of particles between $\frac{1}{4}$ in. and $\frac{1}{32}$ in., and the North Thames Gas Board had already carried out many full-scale tests on commercial crushers to find the most suitable type. It was realised that quantitative tests in purifiers were necessary to decide finally on the best size range, and experiments had been planned on the charging of boxes with screened oxide. Obviously it was not intended to use screening as a control of particle size in works practice, but merely as a means of supplying oxide of known particle size range for testing.

The discrepancy of which Mr. Haynes complained did not exist in the paper, which made it clear that the figures of 20-26 for normal boxes and 21.7 for deep boxes refered to one box only, whereas the figures of 6.25 and 6.1 referred to the complete set of tower purifiers, and were compared in the paper with 5 space volumes per hour set of four normal boxes. If one attempted to classify purifier size by a single criterion, the 'R' ratio or space volumes per hour per box, then it was necessary to remember that some installations consisted of four boxes while others consist of five or six towers. The figure for space volumes per set was one of many ways of allowing for difference in the number of vessels. With regard to dust, there was no intention of screening it out and discarding it. What was intended was to find the most suitable particle size, and then endeavour to obtain it by the use of specially designed crushers and by the control of moisture content of the charge so that dust was held on the surface of the particles.

Mr. Francombe's remarks were very interesting, but it was not possible to compare exactly his figures for costs with the figures in the paper without full details of the methods of estimating. The estimates given in the paper were very comprehensive. For example, the cost of five deep boxes, each 30 ft. square by 12 ft. deep, was given as £80,000. In fact, the five box shells with supports, stairs, crane tracks and handrails amounted to only £12,500. The largest single item was £15,000 for gas mains, valves and heaters. The rest of the total was made up by ground preparation for site and oxide store, ground slab, concrete foundations, mild steel covers, grids, bearers and standards, tar and liquor drains, crane and electrical connections, and contingencies. The provision of fewer and larger boxes would obviously effect a reduction in cost, but not so large as might appear on the basis of this comprehensive estimate. Mr. Francombe appreciated the defects of large boxes, which had in fact been experienced in the North Thames Gas Board for many years and had been the reason for the limitation suggested in the paper. If a practicable method of improving gas distribution by fitting internal ducts could be designed, then large boxes would be re-considered.

Mr. Gedge raised the question of cost and quoted figures for 1951 showing only 30% increase over 1948. Since the price index for March, 1950, was 260, and that for October, 1951, was 375—an increase of nearly 50% in 19 months—it was difficult to see how any installation had increased in cost by only 30% in three years. Costs had risen outrageously, and figures in the paper had been adjusted to present-day prices. The North Thames Gas Board exacted a high standard of plant, which often made comparisons with other boards and with contractors difficult. The view had sometimes been expressed that too high a standard was demanded and that costs were unduly high. The author did not accept this criticism at all. It was better to set a high standard in structural strength and mechanical efficiency than to save money at the expense of reliability. The choice of steel instead of concrete for deep boxes was made because of the use of a grab for emptying the vessel. Maintenance costs for concrete were about the same as for steel. The leakage of gas through concrete purifiers might be considerable.

It was always instructive, continued Mr. Hopton, to have Mr. Veryard's observations on oxide purification. He had perhaps a legitimate grievance over the variation in oxide/gas ratio in the various installations, but there were reasons for it. The deep boxes were provided with five boxes instead of four for reasons set out in the paper. The tower purifiers and tower box purifiers were provided with less oxide than normal boxes by the contractors themselves, and it did in fact seem reasonable that less oxide might be needed by virtue of the supposedly better distribution of gas in flowing from periphery to centre or vice-versa, instead of diagonally from corner to corner in a large flat box. Then the need of changing of vessels affected the size of plant required. However, the variations were not so drastic, in view of the high proportion of the cost of the installation which was not greatly

affected by size, as to falsify the picture of relative costs given in the paper. The size of box installed as standard by the North Thames Gas Board was admittedly still that recommended 30 years ago, but reductions might be made in the light of experience with electrostatic precipitators and oil washing plant before the purifiers, as installed on the Beckton coke oven streams. Whatever might be thought as to the practicability of reductions in size, the station engineer had the responsibility for purification, and if he asked for ample safety margin he ought to be provided with it. It might seem that split flow would be disadvantageous because of unequal distribution between the beds, but in fact in the extreme example of tower purifiers evidence was available that this was not the case. There were many installations with split flow in the country giving satisfactory performance.

Mr. Hopton agreed that fine material should not pass through an oxide crusher, which should work only on material which needed reduction in size. The description in the paper of tower purifiers with mechanical tipping provided with only one layer of oxide per tray was quite correct. The design was different in that respect from former installations of tower purifiers because two layers of grids would be a nuisance during tipping. The hydraulic seal in the tower box purifiers was claimed to be safer and to require less care in placing the trays in position.

The extent of dilution of gas by purging gas used in the measuring hoppers of the mechanical purifiers would depend on the rate of passage of oxide through the purifiers. This in turn would be a function of the activity and capacity of the oxide. It was precisely to determine such points that the mechanical purifiers were being built.

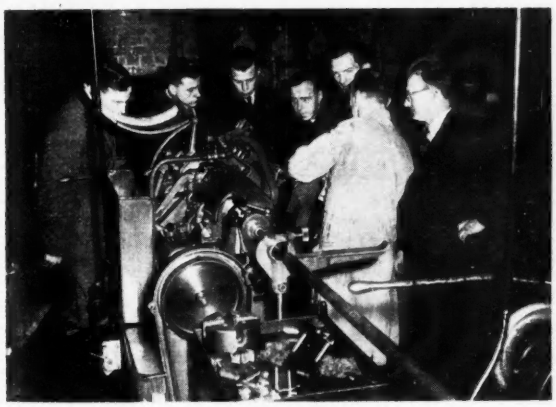
There was one point about the mechanical purifiers which the necessary brevity of the paper did not allow to be raised, but which deserved mention. The author was well aware of the trial in 1950 of the 'dynamic' purifier at Poole using ordinary oxide. The North Thames Gas Board started work on granular forms of iron oxide many years ago, and presented a paper on the subject in 1945, as well as showing plant comprising towers for counter-current passage of oxide with re-cycling at a visit of the Institution of Gas Engineers to Fulham in the same year. The design of the mechanical purifiers was a continuation of the work started before 1945. The design was based primarily on the use of highly active granular material, but it had been found in full-scale tests that the special valves were suitable for screened ordinary oxide also, and experiments would be made with both types of material.

Mr. R. M. Farror (South Eastern) proposed a vote of thanks to Mr. Hopton and **Dr S. Pexton** (North Thames) seconded.

JUNIOR ASSOCIATIONS

LONDON AND SOUTHERN

INSTRUMENTS are becoming increasingly important to the gas engineer, especially the specialised equipment for remote indication and control which is rapidly becoming essential for modern gas distribution networks. Members of the London and Southern Junior Gas Association availed themselves of the opportunity on Dec. 18 last to look behind the scenes and to see how instruments are designed and made at the Lewisham factory of Elliott Brothers (London), Ltd., whose flowmeters, recorders, transmission and other apparatus finds so many applications in the gas industry.



Members of the London and Southern Juniors in the machine shop of Elliott Bros. (London), Ltd., Century Works, Lewisham.

The Elliott organisation consists of three major units, the head office and main works at Lewisham, research laboratories at Borehamwood, and a manufacturing plant at Rochester. It was not possible, in the course of one afternoon to visit all three establishments and the Lewisham factory was selected as most interesting and instructive.

Mr. E. C. Klepp, of Elliott Brothers, gave the visitors an outline of the Company's 151 years in the instrument industry and briefly described the instruments which were of most interest to gas engineers, after which the party divided into groups and went through the various departments of the factory.

After the tour of the works tea was provided, and the President (Mr. J. D. C. Woodall) thanked Elliott Brothers for the facilities offered to the Association. The visitors were then given a lecture and demonstration of the Elliottel system of remote indication and control followed by questions and discussion.

NORTH WALES

ON December 5, 1951, members of the North Wales Section of the Wales and Monmouthshire Junior Gas Association, accompanied by their Chairman, Mr. J. Woodcock, visited the Trent Vale bakery of Birkett and Roberts, Stoke-on-Trent. During the tour of the bakery visitors were impressed by the degree of mechanisation which has been achieved. The focal point of interest was the Baker Perkins conveyor oven in which the baking of all the items produced in the confectionery section is undertaken.

At the conclusion of the inspection the members were entertained at tea in the staff canteen. Following which a paper entitled 'Gas for Bread Baking' was read by Mr. J. A. W. Stretton, Assistant Industrial Engineer to the Wales Gas Board (see *Journal* of January 2, p. 48).

Proposing a vote of thanks to Mr. Stretton, Mr. J. Pepper (Holyhead) stressed the value of the baking load to the gas industry and urged members to support Mr. Stretton's efforts to develop this particular load in North Wales. Mr. W. I. Parry (Holywell) seconded the vote.

The meeting concluded with thanks to Messrs. Birkett and Roberts for the facilities placed at the disposal of the Association.

GAS LIQUOR AS A FERTILISER

There was a printing error in the table at the foot of page 225 of last week's *Journal*. For the sake of clarity the table is reproduced below in its correct form:

Sulphate of Ammonia.

Nitrogen content, 21% by weight.
1 cwt. therefore contains 23½ lb. of nitrogen.
To supply nitrogen at the same rate as liquor at 400 gal. per acre (*i.e.*, 80 lb.) requires approximately 3½ cwt. of sulphate of ammonia.

	s.	d.
3½ cwt. of sulphate of ammonia at, say, 16s.	56	0
Plus labour charges computed at approximately ...	5	0
	61	0

It should be explained that sulphate of ammonia, like most other fertilisers, is subject to a differential price according to the quantity supplied. This ranges from £15 12s. per ton for six tons and over to £17 2s. for less than a ton. In making our comparison, it was thought fair to select an approximately middle price of £16.

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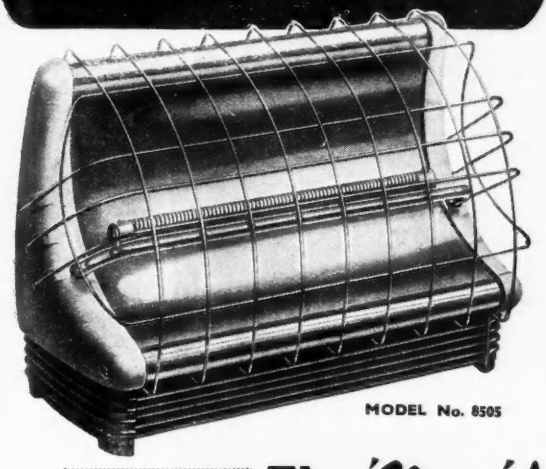

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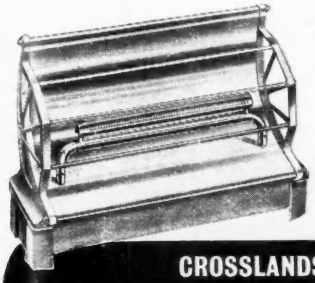

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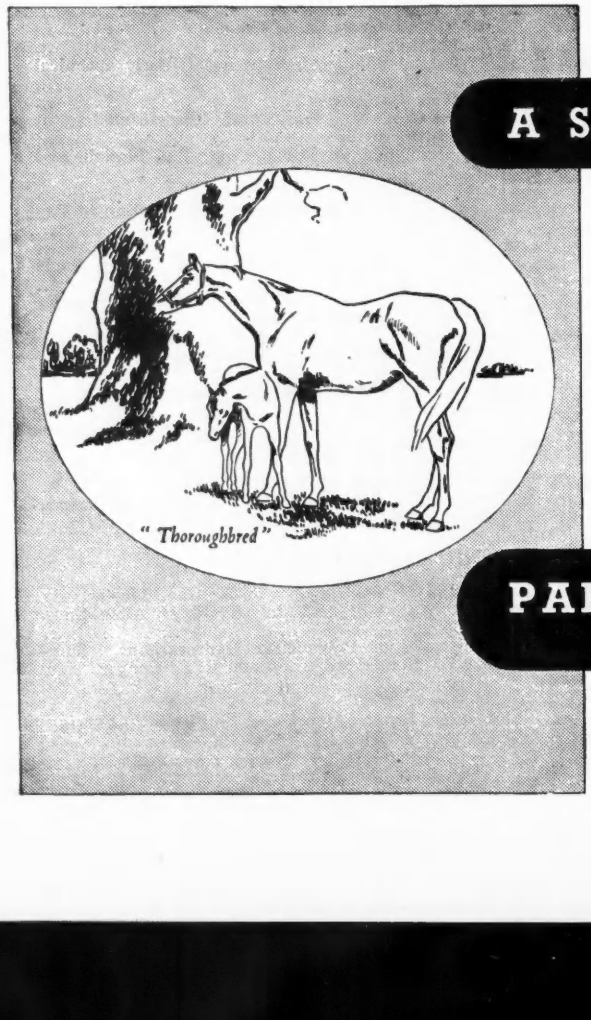

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